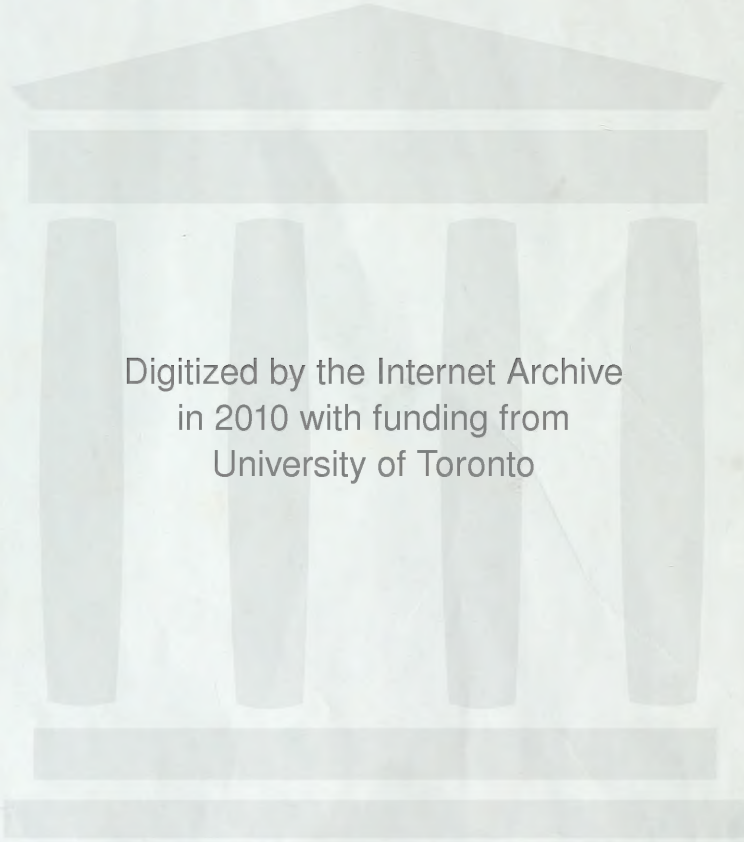

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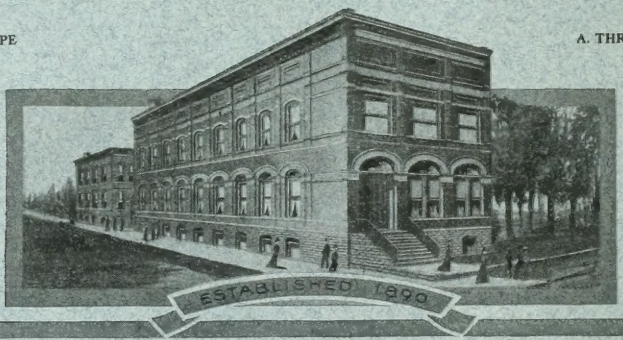

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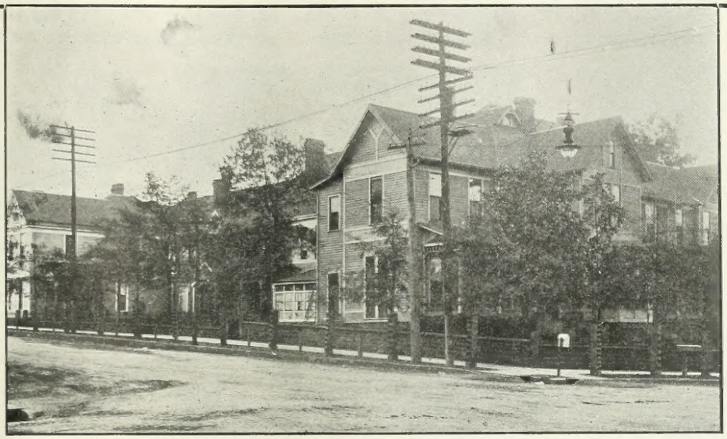

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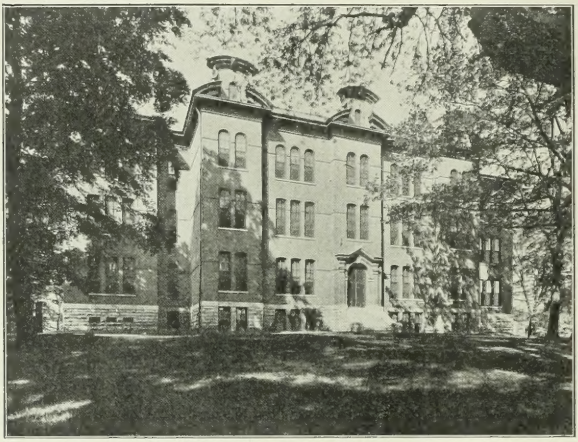

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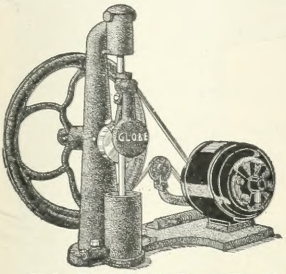

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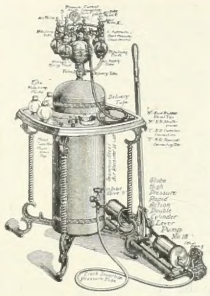

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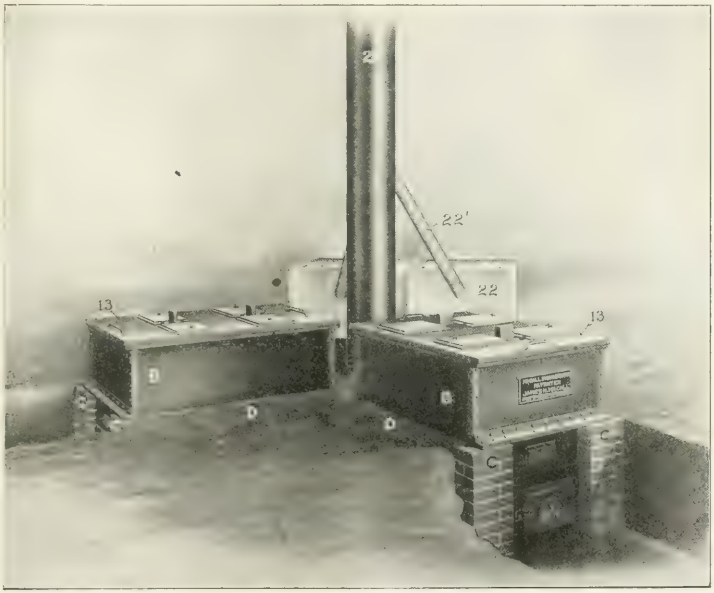

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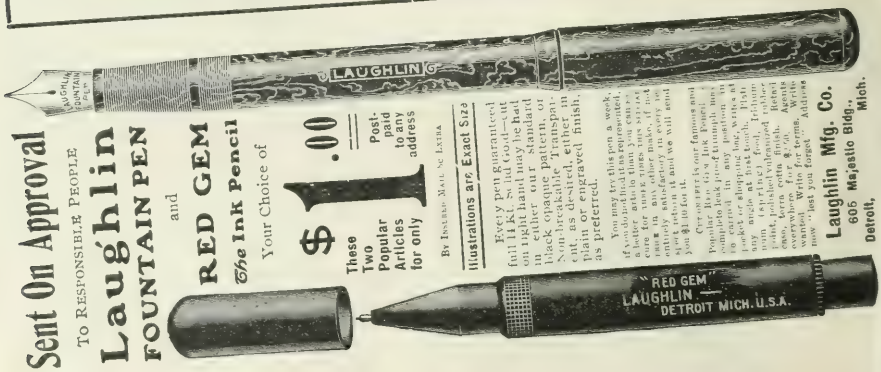

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ORIGINAL CONTRIBUTIONS

PURE MILK AS A FACTOR IN PUBLIC HEALTH.

By R. L. JONES, M. D.,
Nashville, Tenn.

Milk, next to bread, is used more extensively as an article of diet than any other one foodstuff. It enters into almost every meal of almost every person almost every day. It forms the exclusive diet of a large per cent of infants, especially in cities. Moreover, it is taken into the body in most cases in an uncooked state, while most other food products are sterilized by cooking. The importance of securing a wholesome and hygienic milk supply, especially for babies, is therefore obvious, and it is the duty, not only of the constituted authorities, but of all who are interested in the health of the community to aid in securing such wholesome supply.

Milk is an excellent medium for the growth of bacteria, and even when it is produced under the most ideal conditions and with the greatest care, many organisms are found to be present, especially after the lapse of time. In the handling of the ordinary culture media in the laboratory, the utmost care must be exercised to prevent infection and consequent spoiling of the media. But in the production and handling of milk, such painstaking measures cannot be carried out, consequently all the milk of commerce is contaminated by bacteria, usually several times during the several processes of handling. Even the ancients had some knowledge of the contamination of milk, as shown by the following reference to the Talmudic laws: "Milk is one of the beverages that makes the articles of food liable to receive impurities." The first contamination may be while still in the udder through infections or poisonous material present in the cow herself. Bacteria may find their way into the meatus of the teat and grow upward for a short distance into the milk ducts, afterwards multiplying in the whole milk. Bacteria infecting the animal in other parts of the body may also find their way into the milk. This is especially true of the tubercle bacillus. In this connection I will quote from an article by Dr. John R. Mohler, Chief of the Pathological Division Bureau of Animal Industry. "The two principle sources of infection from cattle, and the only ones necessary to be considered, are the meat and milk of tuberculous animals. The fact that most of the cases of bovine tuberculosis above enumerated which occurred in the human were cases of infantile tuberculosis points with grave suspicion to the milk rather than the meat supply. This naturally leads to the question of how and under what condition does the milk become infectious. That the milk coming from a tuberculous udder is capable of transmitting the infectious principle is conceded by all who have given the subject any consideration. It has been equally established that in advanced generalized tuberculosis the udder may secrete bacilli without showing any indication of being affected. Careful experiments performed by trained and eminently responsible investigators have also demonstrated beyond reasonable doubt that tubercle bacilli at certain times may be present in the milk of cows affected with tuberculosis to a degree that can be detected only by the tuberculin test, so that in

a herd of cows in the various stages of tuberculosis it is to be expected that some of them will secrete tuberculous milk, which, when mixed with other cows' milk, makes the entire product dangerous. It has been shown by Eber in Germany and Schroeder in this country that, even when the tubercle bacilli are not being excreted by the udder, the dust and manure of the stable where the diseased animals are kept are in many cases contaminated with tubercle bacilli. This contaminated material may readily infect the milk during the process of milking, even though the milk comes from a healthy cow. The importance of this method of infecting milk cannot be too greatly emphasized, when it is known that cattle in prime condition without any udder lesions and with but slight alterations in the lungs frequently raise tuberculous mucus into the pharynx while coughing, then swallow this material, and thus contaminate the feces. In a recent examination at the Bureau of Animal Industry Experiment Station of the manure passed by twelve cows just purchased from dairy farms in this city and affected with tuberculosis to an extent only demonstrable by the tuberculin test, tubercle bacilli were found in over forty-one per cent of the cases, both by microscopic examination and animal inoculations. The danger from this method of infecting milk is impressed upon us as consumers when we realize that on an average probably twenty-five per cent of all the cows which supply milk to the District of Columbia are tuberculous, and this is considered to be a conservative estimate, judging from the results of recent tuberculin tests."

MODEL MILKING SHED USED ONLY FOR CATTLE—NO PLACE FOR STORING FEED.

Another source of contamination is the dust of a badly constructed and badly managed milking shed. Such sheds as have a loft above for the storing of hay and other feed are invariably dusty from the sifting from above, and even in a properly constructed shed there is an abundance of infectious dust unless it is kept scrupulously clean. As some amount of dust is unavoidable, the milk should not stand in open vessels, but should be removed at once to the milk house.

Improper milking pails with a large opening also contribute to the collection of dust. Much infectious material, often of the worst kind, comes from the dirty hands of the milkers. I have seen milkers who have been working about the barn, handling manure and other unclean substances, proceed to the milking of cows without a pretense of washing the hands. In the milk house or bottling room careless handling also contributes a large number of bacteria to the milk, from the hands of the handlers, dirty surroundings, the proximity to unwashed bottles, flies, dirty strainers, rags, etc. Bottles insufficiently sterilized or not sterilized at all furnish another source of added bacteria. While the practice of bottling milk offers the surest protection when it is properly done, when carelessly done it is a most serious menace to the health of the community. Bottles are collected from customers for refilling, and some of these come from houses in which there are cases of typhoid, scarlet fever, diphtheria and other infectious diseases. If these bottles are not properly sterilized, the germs of these diseases are placed in a most excellent culture media and distributed to families in which the diseases mentioned do not exist.

The practice of selling milk from large cans in the dairy wagons also tends to contamination, especially from the measuring cups, which collect street dust, and from the handling of milk on the street. Dairymen have been known to fill bottles on the street that have been collected from their customers with milk from cans, having, of course, no means of even rinsing the bottles before so doing. This practice happily does not obtain in this city. The consumer may contribute to the infection of the milk by sending to the wagon unclean receptacles or by leaving uncovered buckets or pitchers out over night for the dairyman to fill in the morning.

There are, then, many sources from which bacteria may be added to milk, but even with these reduced to the minimum, care must be taken to prevent the rapid growth of those that do enter. The temperature at which the milk is kept is an important factor. Temperature above 50 F. will permit the rapid growth of organisms. Another factor of importance is the time element. The longer the time that elapses from the cow to the consumer, the greater the number of organisms present.

Milk may directly convey to man diseases that affect cattle, or it may be simply the carrier of organisms that do not affect cattle. Of the diseases of cattle that may affect man may be mentioned the following:—

Actinomycosis—This disease, while not at all infrequent in the maxillary regions of cattle, is quite rarely located in the udder. It is readily mistaken for tuberculosis, owing to the diffuse lesions and the character of the pus. While no known case of actinomycosis in man has been traced to the milk, it is nevertheless advisable to condemn the milk from an infected udder, especially since the virus of the disease in man, in most cases, has been found to enter the body through the alimentary canal. Furthermore, there is usually in actinomycosis a mixed infection with pus-producing cocci, which emphasizes the necessity for prohibiting the use of the milk from such udders.

Botryomycosis—Botryomycosis of the udder is only occasionally met with, but when it is observed, the ultilization of the milk therefrom should not be permitted. The disease is chronic and is accompanied by new connective tissues formation and burrowing sinuses from which pus escapes. Mixed infection is liable to occur in this disease also, which adds to the danger of consuming the milk.

Foot-and-Mouth Disease—This infection is transmissable to man through the consumption of milk from diseased animals, but, fortunately, the disease has been eradicated from this country, and it is to be hoped that this contagion will never require any serious consideration from the sanitarians of the United States in the future.

Anthrax—In this disease the milk has no abnormal appearance and decomposes rapidly. The bacterium of anthrax has been recovered

from milk fourteen days after it had been taken from an infected cow, which illustrates the importance of prohibiting the use of milk from such animals.

Cowpox—This disease, which is probably becoming more common in this country, renders the milk unfit for food, and its distribution from cows so affected should not be permitted, inasmuch as the milk may become contaminated from the pustules and ulcers on the teats and in the sinuses of the udder, and produce infection by the alimentary canal of young children if it is consumed in a raw state. The appearance of dark brown crusts on the teats and udders of cattle is suggestive of several conditions and should be carefully examined, particularly since the isolation by Dean and Todd of an organism identical with the Klebs-Loeffler bacillus from such lesions as well as from the milk. Diphtheria is not a disease of cattle, but it is possible for the abrasion to become infected with this organism from a human origin and the local lesion spread until it involves the milk sinuses. It was also suggested that this udder lesion might be due to an infected milker followinsg the all too common habit of spitting on his hands before commencing to milk and the bacillus passing up the milk duct might thereby infect the sinus.

Rabies—The virus of rabies has in several instances been reported to have been passed to the offspring by the mother's milk. While it is not probable that cattle would be milked after the symptoms of rabies developed, it is nevertheless important to realize the danger of using such milk and the necessity for preventing calves from sucking such diseased cows.

INTERIOR OF MODEL MILKING SHED.

Mammitis, Mastitis, or Garget—This disease, or series of diseases, of the udder is by far the most frequent alteration noted. Usually only one-quarter is affected, although the whole udder may at times be involved. The affected parts are generally swollen and more or less painful in the early stages. The milk, at first normal in appearance, soon changes

its character, becoming watery, light brown in color, and in some cases contains floculli and pus cells and appears tenacious, slimy, or ropy. The cause of this condition is usually a streptococcus, although straphylococci are frequently incriminated in suppurative conditions of the udder, especially where abscess formation occurs. The milk from such an udder is objectionable from an esthetic standpoint and is also liable to give rise to gastro-intestinal disorders, especially in children. Such milk should be prohibited until the inflammatory condition entirely disappears.

Gastro-Enteritis—The milk of cows affected with gastro-enteritis is of abnormal character, being watery, of bitter taste, and changes quickly to a "sweet curdle." This milk is liable to produce digestive disturbances in the consumer, and should not be utilized.

Septic or Febrile Conditions—The presence in the dairy of cows affected with such septic conditions as puerperal sepsis, septic metritis, diffuse phlegmon, supperative wounds, and extensive ulcerations constitutes a grave danger to the milk supply, inasmuch as the milk may become infected with the pus-producing organisms, among which the streptococci are capable of causing enteritis in man. The milk of cows suffering from febrile conditions, especially when associated with sepsis, should also be excluded. In the case of small single wounds which cease to suppurate, the milk may be used without danger, providing the teats and udder are well cleaned before each milking.

Tuberculosis—While there has been some doubt as to the possibility of bovine tuberculosis producing disease in man, especially since the radical statement of Dr. Koch, there is abundant evidence that such infection does occur, as is shown by the following extract from Circular No. 114, U. S. Department of Agriculture: "As a result of this radical statement of Koch's, which was based upon incomplete and unsatisfactory evidence, several government commissions were appointed in different countries, and many private and public scientists immediately took it upon themselves to solve the question raised by that investigator. The results of these experiments were so strikingly similar that it is now the generally accepted opinion among scientists that people, especially children, may become infected with tuberculosis from cattle. It is not known to what extent such infection occurs, nor is it possible to obtain any definite percentage by the method formerly adopted of looking for the primary lesions in the intestinal canal, although much statistical evidence is recorded showing that even by these figures primary intestinal tuberculosis of children has been observed in as high as 45.5 per cent of the tuberculous cases examined. (Heller). Evidence which must be considered conclusive has been obtained by the Bureau of Animal Industry, as well as by Ravenel and a number of French investigators, showing that tuberculous infection may take place through the intestinal tract without leaving any lesion in the abdominal cavity, the first alteration being found in the lungs or the thotacic glands. Therefore the presence of pulmonary tuberculosis in infants without intestinal lesions is no indication that the disease was not transmitted by the food, and the statistics above referred to are thus shown to be below the true percentage of cases of tuberculosis of intestinal origin.

These figures, however, do not give any satisfactory idea as to whether the bacilli entering the intestines originated from human or bovine sources. Owing to this fact, it follows that the only way of determining the infection of people by bacilli or the bovine type will be to study the lesions in the body of as many cases of human tuberculosis as is possible. Already we have sufficient data to give us some idea of the extent of tuberculosis of the bovine type in children without considering the numerous cases of direct transmission recorded by many physicians, especially of instances of butchers and others receiving accidental infections of the skin with the bovine organism. Moreover, according to Von

Behring, the question of infection in man usually goes back to childhood, as he believes that many of the cases of pulmonary tuberculosis in adults is of intestinal origin, infection having occurred primarily through the intestinal tract by drinking tuberculous milk during infancy and having remained latent until adult life.

The finding of the bovine type of tubercle bacillus in human lesions is the most direct and positive proof that tuberculosis of cattle is responsible for a certain amount of tuberculosis in the human family. Numerous experiments with this object in view have already proven this fact. Thus the German Commission on Tuberculosis examined sixteen different cultures from the tubercular lesions in children and found four which were more virulent than is usual for human tubercle bacilli, causing tuberculosis in the cattle inoculated with them, and making 25 per cent of the cases tested that were affected with a form of tuberculosis which, by Koch's own method, must be classified as of bovine origin. In a similar series of tests conducted by the British Royal Commission on Tuberculosis sixty cases of the disease in the human were tested, with the result that fourteen cases were claimed by this commission to have been infected from bovine sources. Revenal reports that of five cases of tuberculosis in children two received their infection from cattle. Theobald Smith has also reported on one culture of the bovine tubercle bacillus obtained from the mesenteric glands of a child out of five cases examined, and according to a recent paper by Goodale, Smith has recently been at work on seven other cultures from different children, four of which conformed to his idea of tubercle bacilli emanating from cattle. Of four cases of generalized tuberculosis in children examined in the Biochemic Division of the Bureau of Animal Industry, two were found to be affected with very virulent organisms, which warranted the conclusion that such children had been infected from a bovine source. The Pathological Division of the same Bureau has likewise, out of the nine cases of infantile tuberculosis examined, obtained two cultures of tubercle bacilli that could not be differentiated from bovine cultures. In Europe so many similar instances of bovine bacilli having been recovered from human tissues are on record that it appears to your committee entirely proven that man is susceptible to tuberculosis caused by animal infections, and while the proportion of such cases cannot be decided with even approximate accuracy, it is nevertheless incumbent upon us to recommend such measures as will guard against these sources of danger when enforced."

Milk as a carrier of infectious diseases—We have seen that milk may acquire infective properties after it leaves the udder of the cow. There have been observed numerous instances in which localized outbreaks of typhoid, scarlet fever and diphtheria, occurring suddenly in families supplied by the same milkman, have been traced to the milk supply. Dr. Michael Taylor was the first to point out in 1857 that cows milk might be the disseminating agent of typhoid where the disease is present in the dairy. He also showed in 1867 that scarlet fever may be distributed in the same way. In 1877 an epidemic of diphtheria was traced to the milk supply by Jacob, and in 1872 Macnamera traced an outbreak of cholera at Calcutta to an infected dairy.

Kober, from a study of the literature, was able to present to the International Medical Congress, held in Paris in 1900, the history of 195 outbreaks of typhoid fever, 99 of scarlet fever and 36 of diphtheria, all of which were traced to the milk supply. "Of the 195 epidemics of typhoid fever tabulated by Dr. Kober, there is evidence in 148 of the disease having prevailed at the farm or dairy. In 67 instances the infection probably reached the milk by percolation of the germs into the well water with which the utensils were washed; in 16 of these the intentional dilution with water is a matter of evidence. In 3 instances the bacillus coli communis and the

typhoid germs were demonstrated in the suspected water. In 7 instances infection is attributed to the cows wading in sewage, polluted water and pastures; in 24 instances the dairy employes also acted as nurses; in 10 instances the patients while suffering from a mild attack or during the onset of the disease, continued their work; and those who are familiar with the personal habits of the average dairy hands will have no difficulty in surmising the manner of direct digital infection. In one instance the milk tins were washed with the same dishcloth used among the fever patients. In two instances dairy employes were connected with the night-soil service, and in another instance the milk had been kept in a closet in the sick room.

In the recent exhaustive investigation conducted by the Public Health and Marine Hospital Service the commission definitely traced 85 of the 866 cases of typhoid fever in the District to the use of infected milk.

Milk-Borne Scarlet Fever Epidemics—Of the 99 epidemics of scarlet fever the disease prevailed in 68 instances at the dairy or milk farm. In 6 instances persons connected with the dairy either lodged in or had visited infected houses. In two instances the infection was conveyed by means of infected bottles or milk cans left in scarlet fever houses. In 17 instances the infection was conveyed by persons connected with the milk business while suffering or recovering from the disease, and in at least 10 instances by persons who acted as nurses while handling the milk. In three instances the milk had been stored in or close to the sick room. In one instance the cans had been wiped with an infected cloth. (In 9 instances the infection was attributed to disease of the milk cows, such as puerperal fever and inflammation of the udder and teats; but these outbreaks were probably not genuine scarlet fever, but a so-called streptococcus or staphylococcus infection, the symptoms of which closely resemble those of scarlet fever).

Milk-Borne Diphtheria Epidemics—Of the 36 outbreaks of diphtheria, there is evidence that the disease prevailed at the dairy or farm in 13 instances. In 3 instances the employes continued to handle the milk while suffering themselves from the disease. In 12 instances the disease is attributed directly to the cows having inflammatory conditions of the teats and udders. (These instances, however, may be regarded as typical examples of streptococcus and staphylococcus infection, giving rise to a form of follicular tonsilitis or pseudo-diphtheria, often difficult to distinguish clinically from true diphtheria or scarlet fever.)

In addition to the foregoing diseases there are recorded a limited number of outbreaks of cholera which have been traced to milk infection through various channels already referred to, chiefly in handling with infected fingers, by contaminated water, and the agency of flies. There is also reason to assume that the organisms of cholera infantum and the infectious agent of smallpox may find in milk a suitable medium for growth and transmission.

It is interesting to note that of the 330 epidemics analyzed by Dr. Kober 243 have been recorded by English authors, 52 by American, 14 by German, 11 by Scandinavian, and 5 each by French and Australian writers. This is probably due to the fact that the English and American usually consume raw milk, while on the Continent the milk is rarely used without being boiled."

Adulteration of Milk—By this term is meant the adding to it anything that is injurious to health, as preservatives or that will change the original proportions of its several constituents, or the taking from it any of its nutritive ingredients. Milk is thus defined by the U. S. Department of Agriculture: "Milk is the fresh, clean lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained 15 days before and 10 days after calving and contains not less than 8½ per cent of solids not fat, and not less than 3¼ of milk fat."

The most common form of adulteration is the addition of water. This not only lowers

the food value of the milk, but is a positive menace to health because the water added is usually unclean, often being contaminated with colon bacilli and other organisms.

Preservatives are injurious in two ways: By the direct effect of preservatives on the human organism, and by giving impure, contaminated milk the appearance of good milk by preventing souring.

Fortunately adulteration is rather easily detected and is not much practiced at the present time.

milk must be properly fed and watered, free from tuberculosis, as shown by the tuberculin test, and from all other communicable diseases, and from all diseases and conditions whatsoever likely to deteriorate the milk. They are to be housed in clean stables, properly ventilated, and to be kept clean. All those who come in contact with the milk must exercise scrupulous cleanliness, and such persons must not harbor the germs of typhoid fever, tuberculosis, diphtheria and other infection liable to be conveyed by the milk. Milk

A WELL KEPT COW, CLEAN AND IN GOOD CONDITION.

Classification of Milk—In order to better supervise the production of milk A. D. Melvin, Chief of the Bureau of Animal Industry, has suggested the following classification: "Class 1, Certified Milk—The use of this term should be limited to milk produced at dairies subjected to periodic inspection and the products of which are subjected to frequent analyses. The cows producing such must be drawn under all precautions necessary to avoid infection, and be immediately strained and cooled, packed in sterilized bottles, and kept at a temperature not exceeding 50° F. until delivered to the consumer. Pure water, as determined by chemical and bacteriological examination, is to be provided for use throughout the dairy farm and dairy. Certified milk should not contain more than 10,000

bacteria per cubic centimeter, and should not be more than 12 hours old when delivered. Such milk shall be certified by the health officer of the District of Columbia.

"Class 2, Inspected Milk—This term should be limited to clean raw milk from healthy cows, as determined by the tuberculin test and physical examination by a qualified veterinary surgeon. The cows are to be fed, watered, housed and milked under good conditions, but not necessarily equal to the conditions provided for Class 1. All those who come in contact with the milk must exercise scrupulous cleanliness, and such persons must not harbor the germs of typhoid fever, tuberculosis, diphtheria, and other infections liable to be conveyed by the milk. This milk is to be delivered in sterilized containers, and is to be kept at a temperature not exceeding 50° F. until it reaches the consumer. It shall contain not more than 100,000 bacteria per cubic centimeter.

Class 3, Pasteurized Milk—Milk from the dairies not able to comply with the requirements specified for the production of milk of classes 1 and 2 is to be pasteurized before being sold, and must be sold under the designation 'pasteurized milk.' Milk for pasteurization shall be kept at all times at a temperature not exceeding 60° F. while in transit from the dairy farm to the pasteurization plant, and milk after pasteurization shall be placed in sterilized containers and delivered to the consumer at a temperature not exceeding 50° F. All milk of an unknown origin shall be placed in class 3 and subjected to clarification and pasteurization. No cow in any way unfit for the production of milk for use by man, as determined upon physical examination by an authorized veterinarian, and no cow suffering from a communicable disease, except as specified below, shall be permitted to remain on any dairy farm on which milk of class 3 is produced, except that cows which upon physical examination do not show physical signs of tuberculosis may be included in dairy herds supplying milk of this class, although they may have reacted to the tuberculin test.

This milk is to be clarified and pasteurized at central pasteurization plants, which shall be under the personal supervision of an officer, or officers, of the health department. These pasteurizing plants may be provided either by private enterprises or by the District Government, and shall be located within the city of Washington.

By the term "pasteurization" as used herein is meant the heating of milk to a temperature of 150° F. or 65°. for 20 minutes, or 160° F. or 70° C. for 10 minutes, as soon as practicable after milking, in inclosed vessels, preferably the final containers, and after such heating immediate cooling to a temperature not exceeding 50° F. or 10° C.

"No milk shall be regarded as pure and wholesome which, after standing for two hours or less, reveals a visible sediment at the bottom of the bottle."

The sediment which is seen at the bottom of a bottle of milk after standing for two hours consists of epithelial cells, pus, blood and cow feces. Such milk is unfit for consumption.

Steps necessary to produce pure milk:

The herds should be examined frequently by a skilled veterinarian. The tuberculin test should be made at least once a year, all reacting cows being isolated from the herd and their milk discarded. All new cows added to the herd should be tested. Cattle should be kept in a stable where no other animals are housed. The stable should be dry, light (four square feet of glass per cow), and well ventilated with at least 500 feet of air to each cow. The stable should be used only for the keeping and milking of cows and should have no loft for the storing of feed. The floor should be kept clean, preferably constructed of concrete with a gutter behind the cows for flushing. All manure should be removed daily. Cows should be well cleaned by brushing at least thirty minutes before milking time. They should be kindly treated, no violence being used in handling or milking. The milking

should be done quickly and thoroughly by milkers with clean hands, wearing an outer garment which should be washed twice a week and kept in a clean place when not used in milking. The udder should be dampened, but not left wet. The milking should be done with dry hands. The pails should be of such construction as to allow a minimum quantity of dust to fall into them during milking, and, of course, should be sterilized before each milking. The milk should be taken immediately to the milk house after the milking of each cow, strained through sterilized cheese cloth or other clean strainer and immediately cooled to below 50° F., but should not be allowed to freeze. The milk house should be clean, well ventilated, screened from flies and should be used for no other purpose than the handling and storing of milk. All utensils should be of metal and should be without rust; they should be well washed after use, sterilized by steam or boiling water and stored inverted in a place free from dust. Bottles should be well sterilized by steam or boiling water. Milk should be kept at a temperature below 50° F. until delivered to the consumer and should be delivered within thirty hours after milking.

Steps necessary to secure the production of pure milk supply:

The production of milk for cities should be under city or county control, or both: only such dairies as properly handle milk being allowed to sell. Competent inspectors should visit dairies frequently to see that the requirements of law are maintained, to inspect the herds and to aid the dairymen by instruction and advice. All herds should be given the tuberculin test under municipal or county control. The laboratory should be maintained to see that the milk comes up to the required standard, examination being made of the product of all dairies at frequent and irregular intervals. Dairymen should be instructed by the Health Boards and encouraged to better their production.

The general public must be informed concerning the significance of clean milk. The market for cheap, dirty milk must be destroyed as far as possible by the education of the public concerning its significance. Clean milk costs more, but people will not pay the increased price until they see the advantage. In matters concerning legislation and prosecution the support of the public is desirable, if not indispensable.

The publication of the results of scoring dairies, showing their relative standing, is a useful educational factor. This must be done circumspectly to avoid damage suits instituted by those dairymen who do not make a favorable showing. It seems safe to convey these facts in an official report, for instance, by the inspector or health officer to the Board of Health. This report may be given wide publicity in the press as a part in the proceedings of the board. Before going farther than this it would be well to determine the possible consequences.

Public education should include matters concerning the care of milk in the home, such as cleanliness of utensils, refrigerators, home pasteurization and the keeping qualities of pasteurized milk.

151 *Eighth Avenue, North.*

THE DIAGNOSIS AND TREATMENT OF INTESTINAL PERFORATION WITH REPORT OF TWO SUCCESSFUL CASES.

By W. WHATLEY BATTEY, JR.,

Assistant Professor Anatomy and Clinical Surgery, Medical Department, University of Georgia. Augusta, Ga.

Mr. President and Gentlemen—

In discussing "Intestinal Perforation" I wish to confine myself to that variety occurring during the course of typhoid fever and that produced by abdominal contusions (contre coup) without evidence of external injury of abdominal wall.

The typhoid variety occurs, as a rule, between end of second and fourth week. While distention and hemorrhage favor perforation, it often occurs when such conditions do not exist, and it may occur when least expected. Ambulatory cases, apparently improving, end disastrously in perforation. The most evident symptoms are pain, rigidity, drop in temperature, increased pulse rate and anxious expression. Without a doubt the pain is the most prominent early symptom which should attract our careful consideration. To observe any one or all symptoms of perforation, it is absolutely necessary that we should follow our typhoid cases with the greatest care from the moment of the infection until the patient is discharged as cured. A systematic careful and daily examination of the abdomen should be made in all cases and daily changes noted. Some patients have more pain than others during the disease, but the one attack of cutting, boring pain of sudden onset, followed by other symptoms mentioned, clinches the diagnosis.

In typhoid cases when there is no delirium, when the symptoms of perforation present themselves, we are enabled to elicit much valuable information from the patient; but in cases where there is delirium, our diagnostic ability is taxed to the utmost and the most important symptom—pain—is not to be depended upon.

In this variety of cases we must depend upon chill, nausea, vomiting and subsequent sudden drop in temperature, increased rate of pulse, loss of liver dullness, shifting dullness and loss of abdominal respiration. These last three symptoms unfortunately are due to peritonitis following perforation, rather than to perforation, thus increasing our operative mortality.

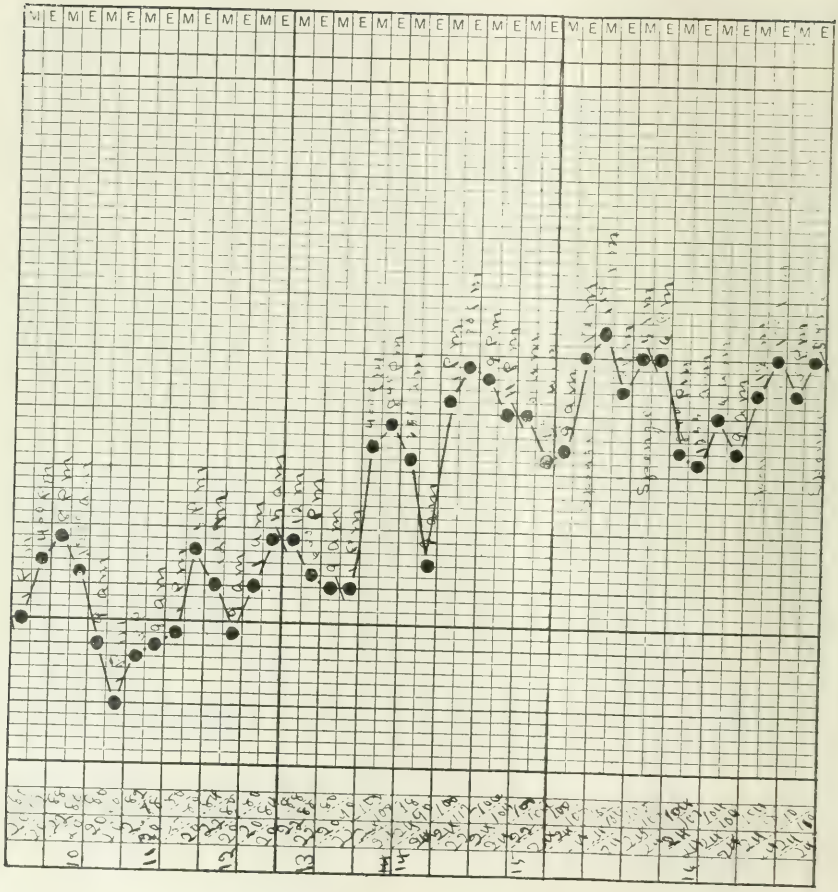
While it seems reasonable to suppose that hemorrhage in cases means possible perforation, perforation does not depend upon hemorrhage, and because our patients do not have hemorrhage we should not be misled in believing that they are not in constant danger of perforation.

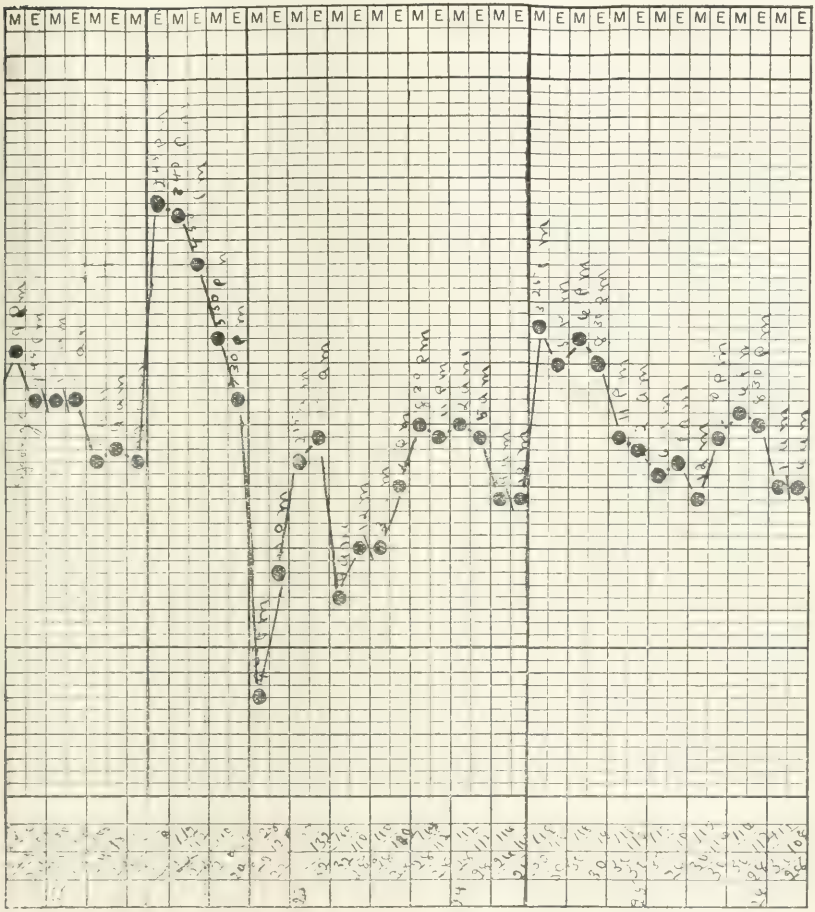
The diagnostic sign as proposed by Brown of Rome, N. Y., "the dipping crackle" in trained hands would be a valuable confirmatory sign. The sign is elicited by placing bell of stethoscope over the right illiac fossa and dipping suddenly with it as in dipping palpation, a very fine crackle is to be heard, due to contact of visceral and parietal peritoneum, the inflamed surfaces apparently sticking together momentarily. To appreciate its value it must be tried early, for as intestines become tympanitic it is no longer to be heard.

Another sign which may be of great value is the extension of pain and tenderness upon changing position of patient, thus showing up within ten or fifteen minutes after change.

The other variety of intestinal perforation is that due to contusions of abdomen without evidence of injury of abdominal wall. A factor in the production of this variety would be the condition of intestinal tract in presence or absence of tympany would be more likely followed by rupture of intestines than when the abdomen is more or less collapsed.

While these two conditions, intestinal per-





foration of typhoid and intestinal rupture, due to abdominal injury, are due to unlike causes, the early diagnosis of both is founded upon reliable clinical signs, which if misinterpreted, early in the condition, our efforts to save life are futile.

The treatment of intestinal perforation is operative, and yet I am of the opinion that cases of perforation occasionally recover without operation. The wonderful protective property of the peritoneum in walling off inflammatory conditions holds good in intestinal perforation as will be shown in case report. But of course to advise other than operation is criminal to a degree.

The selection of an anaesthetic is the most important consideration. There is no greater field for employment of local anaesthesia than in intestinal perforation. It combines many advantages. First of all, in typhoid fever the vitality of the patient must be considered, and by administering a general anaesthetic, we are adding fuel to the flame. Local anaesthesia can be employed practically painlessly by method of infiltration, the only appreciable pain being the peritoneum when it is opened. But since there is an element of doubt in some cases and our operation is exploratory, we have harmed the patient only a trifle by operation with local anaesthesia, if the perforation e not present.

Upon opening the peritoneum, if perforation has taken place, there is a sudden escape of gas or fluid which gives the patient a feeling of temporary relief. After the diagnosis is positive, if the perforation is not easy of access and the intestines are very tympanitic, the use of a few whiffs of anaesthetic, occasionally, will enable us to work with a greater degree of rapidity.

In typhoid perforation the area of typhoid involvement is usually confined to a limited area, and this is usually quickly found without difficulty. The perforation should be properly closed and other areas suspicious of possible perforation should be reinforced by peri- neal sutures.

In rupture or perforation of second variety the entire intestinal tract should be explored, and discretion used as to the necessity of resection or closure of intestinal hole.

As to irrigation of abdominal cavity much has been said for and against. While Murphy has had remarkable results in peritonitis cases by relying upon position and proctoclysis and discarding irrigation of cavity; in the two cases that I will report I resorted to irrigation of abdominal cavity in both cases, mainly because in case of rupture there were faecal accumulations in abdominal cavity that I wished to cleanse out, and in the perforation case there seemed to be much serum and faecal matter in the abdomen. While I appreciated at the time that I was not acting according to the present accepted method of choice, both cases made uneventful recoveries, the interesting data in both being seen in the following reports:

Mrs. A., age, 38; residence, Savannah Road, Augusta, Ga.

Family History—Negative.

Past History—Negative.

Present History—On February 22, 1909, Mrs. A. was taken sick with fever and some abdominal pain. Constipated. I saw the patient on February 25 at her home, Savannah Road. Physical signs were as follows: Few rales over chest. Abdomen slightly distended and tympanitic. Some soreness in right illiac fossa. Vaginal examination, negative. No rose spots. Temperature, 101; pulse, 96; respiration, 24. I advised removing the patient to City Hospital. Advice was taken and patient was removed to hospital the following day. Upon admission, temperature, 100; pulse, 100; respiration, 24. Tenderness in right illiac fossa. Urinary examination negative. Leucocytosis 11,000. Malaria, negative. Patient complained of a great deal of nausea, but did not vomit. From February 26 to March 10 evening temperature did not exceed 102. Morning temperature touched normal several times. On March 10 at 1 p. m. temperature dropped to 97 by mouth. Pulse, 82. Patient

complained of some little abdominal pain, but owing to low pulse rate and good general condition I did not attach any importance to 97 temperature, since it had been 98 the morning before, and I felt that she was probably beginning to convalesce. Widal examination at this time was positive. Following day temperature ranged from 99 4-5 to 100 2-5. On March 22, twenty-eight days from the beginning of symptoms of typhoid, at 10 a. m., patient complained of pain in the abdomen when coughing. She had at this time a slight liquid bowel movement with particles of faecal matter. At 10:30 a. m. complained of cramping pain in abdomen followed by slight liquid movement. Temperature, 101 2-5; pulse, 100; respiration, 22. At 12:15 complained of severe pain in lower part of abdomen. Rectal tube was inserted with no result. Turpentine stupe applied to abdomen. At 2:45 temperature 104 3-5; pulse, 110; respiration, 22. At 3:40 temperature, 104 2-5; pulse, 112; respiration, 22. At 5:50 temperature, 103 3-5; pulse, 110; respiration, 20. At 7:30 p. m., temperature, 102 3-5; pulse, 124. At 9:20 p. m., temperature, 97 3-5; pulse, 128; respiration, 20. At this time the abdomen was beginning to show distention, somewhat rigid; abdominal pain general; slight nausea and anxious expression. I felt certain that perforation had occurred, and the patient was prepared for operation. Under local anaesthesia, assisted by House Staff, median incision was made. As soon as peritoneum was opened there was a gush of gas and serous fluid. Patient gave a sigh of relief; she became exceedingly nervous, so Dr. Battey, Sr., gave her a little chloroform. Incision was lengthened and intestines inspected. I found an area of typhoid involvement about one foot in length in small bowel, in ileum within six inches of caecum a perforation about the size of a slate pencil communicating with cavity, also an attachment of omentum to bowel three inches above perforation. In an attempt to separate omentum, which was tightly adherent, a former perforation was disclosed, thus showing that perforation had occurred at an earlier period of the disease without positive symptoms, except one attack of boring pain lasting about one-half hour during the second week of fever, the wonderful action of nature saving a peritonitis and undoubtedly proving that perforation may happen in many cases without resulting fatally.

The last perforation was closed by Lembert sutures. Abdomen was flushed out with saline solution, owing to the fact that faecal accumulations had escaped through opening in the cavity. Mickulicz drains inserted in pelvis; abdomen closed by layers; patient returned to room; placed in Fowler position with Murphey irrigations and stimulation; drainage tubes were removed by piecemeal daily and completely recovered by twelfth day.

The further history of the case is without interest. Patient left Hospital on April 24 with small granulating wound, which healed completely in two weeks.

I saw patient three weeks ago. She weighs 180 pounds and is in splendid health.

Intestinal Rupture.—

Thos. J. Cato, No. 831 Liberty Street; age, 34 years. Employee of the Augusta Lumber Company.

History of Accident.—

On January 4, 1910, at about 4 p. m., while ripping boards, one piece of board mounted saw, threw same backward, striking operator. At the time of injury the operator had on undershirt, top shirt, drawers, trousers and overalls all covering his abdomen. When the accident occurred the operator felt as though something had knocked a hole into him, to use his expression. He stopped work for a few minutes, then resumed work, feeling somewhat weak. He worked for one-half hour and was then forced to stop because he felt as though he were "burning up inside." He was taken home in a conveyance, reaching there about 5 p. m. I saw him at about 5:30 and found him sitting up in his room. He stated that he felt very well, but was weak. I had him put to bed and catheterized him to

be certain that there was no bladder rupture. An examination of the abdomen revealed slight tenderness one inch below and to the left of umbilicus. No evidence of injury to abdominal wall. Abdomen slightly tympanitic; no dullness. Temperature, 98 4-5; pulse, 88; respiration, 24. I advised patient to take a dose of Magnes Sulph. He told me that he had taken a dose of castor oil in the morning, but without results. I also advised him to call me at once if he had any abdominal pain. At 7:30 p. m. of the same day I was called hurriedly to the patient, receiving a message that he was suffering intensely. I went immediately to his home and found him rolling from side to side in bed with intense pain in the abdomen. The abdomen was of boardlike rigidity and somewhat retracted and very sensitive to pressure. The flanks were dull on percussion. He vomited several times. I believed there was a rupture and decided to operate at once. Patient was taken to the hospital and I operated at 10 p. m., six hours after injury.

Operation.—

Chloroform was administered by Dr. Battey, Sr.; assistants were House Staff of Hospital. On opening the abdomen there was an escape of brownish fluid of faecal appearance. Examination of the stomach revealed no lesion. The transverse colon and omentum were drawn up, allowing more fluid to escape; no lesin found. The intestines were somewhat injected and covered in spots by plaster lymph. A systematic examination of the small intestines showed a perforation about the size of a ten cent piece. Perforation closed by Lembert sutures. Abdominal cavity flushed with saline solution. Drainage tube inserted in pelvis. Abdomen closed in layers, leaving room for drainage tubes.

After Treatment.—

Fowler position, Murphey irrigation. Bowels were moved on second day after operation with compound licorice powder. On third day patient was eating regular meals. He was discharged—cured—in two weeks. In British Medical Journal of October 9, 1909, Dr. Radcliffe reports a case of traumatic rupture of small intestine, due to blow in epigastum by sharp end of plank. He was operated upon ten hours after injury. A longitudinal rupture 3-4 inch in length was found in jejunum about two feet from commencement. Rupture was closed with continuous Lembert sutures. A second suprapubic incision was made and drainage inserted in pelvis. Another incision was made through parietes over aupendix for performance of appendicostomy. A continuous saline irrigation of normal salt was carried on through the appendix stump for 48 hours. Patient recovered with faceal fistula, which lasted for a week.

I mention this case in order to obtain a discussion as to the value of appendicostomy in such cases, since having gotten such a splendid result with its performance.

CANCER OF THE BREAST.*

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The tendency is prevalent to standardize surgical procedure and has already often gone so far as to render surgical work a kind of blacksmithing in human tissues; so that if a given diagnosis is made, sometimes if it is only surmised, then a certain very definite operation is accepted as being clearly and unquestionably indicated—nothing short of it

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will suffice—and is insisted upon. In keeping with this radical mechanicalism many an ovary was sacrificed in our learning days, many a gall bladder removed that could with advantage have been spared by a more conservative operation, and countless hosts of healthy appendices have gone to the happy hunting ground by the ruthless hand of surgery. The ovaries were sacrificed because the rabid dictum was handed down that all diseased ovaries ought to be removed and because surgeons were not women; if they had been and testicles instead of ovaries had been the quarry so much sought, the earth would still resound with the echoes of the wailing. One would have thought the plague had started on a new epidemic. The cholecystectomies were done because they added only a little to the mortality and removed the trouble at a sweep; later on we found it might have been better to leave *in situ* all the gall bladders we could. We are cured on that score. And the reason for the removal of the appendix is because it is the goat. The patient has belly-ache, cut out his appendix. You diagnose gall-stones or gastric ulcer or chronic pancreatitis, and at operation find the structures all normal, remove the appendix; yes, you may as a prophyloctic work, but do not flatter yourself that when you have removed the pale, soft, uninflamed, empty little piece of gut you have produced a sure cure. The rule is followed, surgery is vindicated with a kind of "Vengeance is mine." But we should not forget after all that our mechanical work is based on pathological, anatomical and physiological facts, and that these should enter wherever they may in determining our action.

Therefore I have chosen two items of the broad subject cancer of the breast for investigation in this paper, and mean to study them with especial reference to the standards created in the minds of the profession by the investigations of the last twenty-five years; standards the following of which has doubtless overdone the real demands in many cases. The two items to be discussed to-night are those cases on the borderline between benign and malignant tumors of the breast and, second, those cases, admittedly malignant, on the borderline between operable and inoperable. In the former instance I propose to investigate dispassionately what degree of conservatism is warranted, and in the latter to what extent our radical efforts may be carried conscientiously.

First, then, we must define malignancy from the histo-pathological standpoint, since our action is to be based upon microscopical findings, and depend in no way upon the usual conception that cancer is a malignant epithelial tumer which, if left alone, is sure to terminate fatally in a very short while, a few months, rarely in three to four or more years. Then in order for our doing as radical an operation in every instance as if a full-fledged cancer of the breast were present unmistakable from either the clinical or microscopical evidence, we should be quite certain that the condition present demands it.

It is granted that the present high rate of permanent recovery from cancer of the breast is the fruit of radical surgery, with allowance for a certain percentage of microscopical failures; it is granted that the operation is very safe in skilful hands. We cannot deny, however, that when a radical breast operation is done a certain amount of crippling the function of the upper extremity follows; or that it is with considerable reluctance that any young woman parts with one of her breasts, whether she be a single woman or a wife with her child-bearing period still ahead of her. A part of this is sentiment, it is true, but it is a sentiment so widely distributed that probably few even among physicians would be willing to marry a young woman who, he knew, had had one or both breasts removed for supposed cancer; he would still be unwilling, though he knew she was permanently cured. It is sentiment positively, but most men would shy at it. Put it another way: Imagine the wedding had occurred and the discovery was made only afterwards, do you not suppose there would

be a perceptible drop in your own esteem as to the market value of your possession? I think so. Then, sentiment or fact, it remains an objectionable procedure even when absolutely necessary. I have not mentioned the function of lactation, which, however important some of us may consider it, is among others considered a relic of barbarism; but it is not to be forgotten.

There are degrees of malignancy. The pathologist reporting to the surgeon on examination will report that the tumor is carcinoma; at the same time he makes his observation of this fact he can, and does, report the degree of malignancy. The question cannot be evaded that this influences the chances of return; can we accept it as legitimate practice to permit it to influence the extensiveness of our work, "the thoroughness" of our work. This is accepted as a good practical rule elsewhere and is at least worth consideration here. We act upon it in many cases of sarcoma, frequently, I believe, without knowing, for do we not remove numbers of small tumors from the extremities without ever suspecting sarcoma? My personal experience with small tumors removed from various points on the body surface has convinced me that this is unquestionably true. We even go further than this, and classify the procedure to be applied in a case of sarcoma by the type of sarcoma.

Let us admit that carcinoma of the breast is variable in its malignancy, and that the degree of malignancy can be determined with fair accuracy by a competent pathologist.

What is the essential difference between a benign and a malignant tumor, when studied under the microscope? It takes no cognizance of the history, of the clinical symptoms and signs and must stand alone on present evidence. The substance may be given by stating that the difference depends on the behavior of the cells, good behavior in benign tumors and bad behavior malignant. The malignant cells are sometimes called insane cells, for they do not conform their conduct to that of normal cells of the type in question. Take a case of adenoma of the breast and one of carcinoma of the breast. The normal arrangement of the epithelial cells constituting the glandular functionating tissue is definite, the secretory cells maintain their position external to the connective tissue base and in communication with the lumens of the ducts. In other words, they line the canals and spaces of the breast. An adenoma of the breast is made up of gross specimens of breast tissue out of connection with the ducts. It may even secrete a fluid, but there is no escape for this fluid, it accumulates and produces a cyst-adenoma; still the relation of the epithelial cells to their basement membrane is preserved. In carcinoma of the breast the disturbance of relation is not essentially gross but cellular, and manifests itself by the growth of epithelial cells into and through the limiting membrane across which normal cells and benign tumor cells do not pass. In the benign tumor the proliferation of epithelial cells may be voluminous, but they remain within the spaces allotted to them by their tumor connective tissue. In the malignant tumor there is no limit to the extent of their growth beyond this connective tissue. These malignant cells may originate from the epithelial cells directly, or the first manifestation may be a tumor apparently benign which assumes a malignant character at some stage of its development, although it is a mooted question whether a tumor that is malignant at present ever was benign. Some claim that, however benignly it may have behaved and however long it may have behaved benignly, nevertheless it was malignant from its origin. I said awhile ago that the benign tumor is of good behavior and a malignant tumor is of bad behavior. As a matter of fact there are all grades of good behavior in the former and all degrees of bad behavior in the latter. So that the pathologist is at a loss to tell in which category to classify his specimen. His report, therefore, comes in with the statement that the tumor is benign throughout except at one

point, and that at that point he had found a tendency of the cells to penetrate their limiting membrane. That if the tumor had been left a few months it would undoubtedly have proved itself malignant. Or he reports that he found distinct signs of malignancy, and that signs were very limited, and that the remainder of the tumor showed only benignant relations. This class of reports is rather frequent, and I am not censuring the pathologist; but what is the duty of the surgeon under such circumstances and when the pathologist says he does not know whether to say the tumor is malignant or not? What influence have cures based on these reports had on our statistics?

In his discussion of Dr. J. N. Jackson's paper read before the surgical section of the sixtieth annual meeting of the American Medical Association in Atlantic City, 1909, Dr. W. H. Welsh made the following observations, which, I think, are very appropriate in answer to the question concerning the duty of the surgeon in case of uncertainty: "In my opinion," says Dr. Welsh, "the cases about which there is doubt in the opinion of the pathologist, as a rule, are not malignant. My experience has been that if a case is one of true malignancy there is not much difficulty in the diagnosis, and I am rather impressed with the view that on the whole the errors are made on the other side, of making a diagnosis of malignancy when it is not justified by the findings. It is of the utmost importance that the pathologist familiarize himself with all the deviations that can occur in normal material within the physiologic limits. In the uterus, particularly, there is a very wide range of deviation from the normal in the utricular glands, which is not, however, in any way significant of malignancy. In the breast, too, there are not a few deviations from the normal which have no significance at all so far as tendency to malignancy is concerned. I would urge all who make the examinations that they acquaint themselves with these deviations from the normal within physiologic limits, and also with those conditions which in any way indicate any tendency toward a malignant growth. I think that this is worth emphasizing.

"Then again, the diagnosis which surgeons receive from pathologists in whom they have confidence are often misinterpreted—small matters of misinterpretation of the growth or of nomenclature. When specimens are sent me for diagnosis that have been diagnosed wrongly, I generally point out that good pathologists may differ in their nomenclature, and one man may choose to call a specimen an endothelioma that I might prefer to call a carcinoma. That is a matter of difference of opinion entirely and I would not consider that as an accusation against the value of microscopic diagnosis."*

Now I am not questioning the procedure in a case of cancer of the breast, but I do question our diagnosis and our methods of treating patients with a suspicion that if the tumor had remained an indefinite period, say six or twelve months, it would have unmistakably shown definite signs of malignancy. It is the absence of definite and positive signs of malignancy at the time of operation that assures me that we frequently have done major operations in the past when minor would have amply sufficed and that we have reduced our percentage of recurrence more in our tabulated lists than we have in fact.

The fault is attributable to two causes: First, that the pathologist has a small excised piece of tumor submitted to him and must pass on it when it is generally known that a tumor may show unmistakably positive evidence of malignancy at one point and at another no evidence whatever. He is allowed no study of the gross specimen, and has no choice of selection of foci which he may use for section. Moreover, this practice of cutting segments from deep tumors is at present condemned by practically all pathologists and most surgeons because of the possibility of producing grafts during excision.

Second, the hurry necessitated by the study of frozen sections and the restriction entailed

thereby of covering very limited areas of the tumor should not be accepted as final except in those cases where the findings are positive. The pathologist should have the privilege of reversing his opinion, drawn from frozen sections, when he has had opportunity to take the specimen to his laboratory and study it leisurely and thoroughly; indeed this should be requested by the surgeon on behalf of his patient, and no frozen section results should be accepted as ultimately negative until confirmed by the most trustworthy methods.

Again, since the microscope is so positively uncertain in many of these cases, since indeed it is sometimes absolutely impossible to determine the presence or absence of malignancy by this means, such determinations should be made only by those who are well trained in its use. Too much depends on it; the novice may play with bacteria, may actually be able to stain and recognize gonococci and tubercle bacilli; but he cannot accurately pass judgment on malignant tumors, the physiologic variations and other pathological conditions cannot be reliably differentiated by him, and should be entrusted only to the expert.

As to the influence this uncertainty may produce on the reliability of our statistics, little need be said; we have very correctly learned that the sooner we remove a malignant growth the better the chance of cure; we have seen, too, from the highest authority on the continent that most of the questionable cases are non-malignant; still we may rest assured that when the question was great enough to cause the attending surgeon to resort to radical treatment he accepted the growth as being malignant and will very likely include it in his list of cases that had not returned after three years. So, then, a presumption is raised that the real percentage of non-recurrence of cancer of the breast, as well as of certain other organs is less than the estimated percentage. How much less cannot even be guessed.

What, then, is the course to pursue relative to borderline cases of breast tumors? We accept the view that all cancers are primarily localized to the site of their origin. If so, then it would seem still more certain that in those cases where, after a thorough gross and microscopical study, a competent pathologist is unable to say that the tumor is positively malignant, we should consider the malignant cells the most localized, even if we should admit them to be malignant. It is inconceivable that any one should maintain the possibility of infiltration, metastasis or extension by growth along the lymph channels and spaces before any cancer cells have matured suffiiciently to point definitely to their true nature; inconceivable indeed that the cells of such a tumor could fail to be confined to the tumor mass, and therefore be removed when that mass is excised, and that without a chance of recurrence except when the tumor substance has been cut during removal or during the excision of a bit for pathological investigation. Not only does this seem reasonable, but it is in strict accord with our practice at other points on the body, and in small sarcomata superficially located. If we should find that a small excised tumor of the skin of the leg were sarcoma after we had dissected the tumor out with a reasonable amount of healthy tissue around it, and many more such small tumors are malignant than we imagine, we would hardly recommend amputation at or above the knee, unless some special reason forced us to it, and we would hardly obtain the consent of our patient to the performance of such an operation. If we add to this argument the statement of Welsh, which, it is needless to say, I accept with the greatest alacrity, that most mammary tumors which do not show positive signs of malignancy are non-malignant, it seems that there can be but one just conclusion, fair alike to the surgeon and surgical records and to the patient: If a woman presents herself with a tumor in her breast, the whole of the details should be explained to her. The tumor should be removed, never by the pretty enucleation method, but by cutting through the whole thickness of the breast along radii leading from the nipple, rather

widely separated from the edges of the tumor. An immediate examination should be made by frozen section; if cancer is found the radical operation should be done at once; if the findings are negative, or if they are only suspicious, the incision should be closed and the surer methods of the laboratory resorted to. If these prove positive at any one point of the tumor, however small, the breast and axillary and submammary tissue should be removed most radically. If they are negative, or if questionable. I think we may safely accept the excision recommended above as being adequate to the demands of the case. It is paradoxical to my mind that a malignant tumor should begin its clinical development by infiltration or metastasis and only later show microscopical evidence of its appearance at its site of origin. If this is true there can be no justification of the radical breast operation on the truly borderline cases. The surgeon has no right to do such an operation on an uncertain diagnosis, for, while the mortality may be only one-half of one per cent to one per cent, and while the patient would not hesitate to act under a positive diagnosis, yet we have no right to offer, nor she to assume, even this small risk together with a positive and unavoidable crippling of more than one function simply because the tumor is microscopically suspicious. If the tumor is suspicious in any true sense of the word, it is wise to keep her under quarterly observation until sufficient time has elapsed to assure the surgeon of his ground, but he must not lose sight of the fact that so long as the tumor is simply suspicious, that long the presumption of innocence is in its favor; circumstantial evidence is of little value here, it must be positive. If it is not positive, Welsh thinks there is a high probability of its being negative.

I have removed breasts when I knew the pathologist was not quite certain; I have removed small tumors similar in their cellular arrangement, and afterwards failed to gain the consent of the patient to amputate on suspicion; I have advised them to leave the breast under observation after removal of the tumor and have so far found the results the same, except the crippling effect of the radical operation.

The second section of this paper is to deal with the other extreme, namely, the determination of the borderline between operable and inoperable cases of cancer of the breast. By the term operable is meant those cases in which so far as experience teaches us there is even a remote chance of permanent cure, and by inoperable all those cases in which we have positive evidence that surgical cure is altogether impossible. The question, therefore, confronting us is what constitutes an inoperable carcinoma of the breast. This question has no reference to palliative operations, which are undertaken with knowledge that a cure cannot be accomplished.

The first and simplest group of cases falling under the inoperable class are those which have produced metastases. Metastasis is used here in the usual sense of blood dissemination. It is presumable, and postmortems sustain the presumption, that if a single metastasis can be demonstrated clinically, a large number may be admitted. Even when the discoverable metastasis is so situated that it may be thoroughly removed, such removal would not increase the probability of cure. In reality, when discoverable, the metastases are usually so situated that removal is out of the question. Direct discovery of the metastatic mass cannot be accepted as the only evidence for decision that metastases are present. All other evidence of tumor existence, such as pathological fractures, pressure symptoms arising in the cerebro-spinal system, and disturbances of the visceral functions must be closely scrutinized if a history of malignant tumor be present as the nature of such disturbance can often be accepted as reliably as if a gross palpable mass were found. Sometimes tumors are removed with the hope of cure, when a thorough physical examination would reveal the futility of our work by revealing metastases which would cause death sooner than the original tumor

could. Indeed the metastasis sometimes brings the patient to consult a surgeon when she is concealing the primary growth or even has failed to observe its presence. Halsted had two cases in which axillary involvement was extensive, but the primary growth in the breast escaped notice. Therefore, it is impossible to decide as to the operability of a cancer of the breast by simply examining the local tumor, except where the examination is made during the early months of the growth.

Second, all those cases of cancer of the breast are inoperable which have by infiltration or growth along the lymphatics extended to the chest wall or the pleura, lungs and mediastinum, or into the abdominal cavity, for owing to the structure involved or the extent of tissue affected by the spread of the tumor from the breast to the secondary focus removal becomes impossible.

This leads us to the consideration of the outlook in those cases where the cancerous affection still lies outside the body cavities, has not invaded the chest wall, and has not produced demonstrable metastases. In a word, it leads us to this question: To what extent may skin, muscles, adjacent bones, except thoracic, and lymphatics be involved without rendering cure impossible? Attention is especially called to this point, as it has become rather widely accepted that if axillary involvement has accurred there are no cures possible. I quote from Rodman's Diseases of the Breast: "Naturally those cases in which the axillary glands are grossly diseased, in which the tumor is firmly adherent to the skin, and in which ulceration has occurred offer a less favorable prognosis than those in which these phenomena are not present. Those in which ulceration has taken place are the most unfavorable of all. Of thirty-one patients operated upon after ulceration had taken place Wunderli reports only two living at the end of three years. Cases in which the superclavicular glands are involved also offer a poor prognosis, but I do not consider them impossible unless the glands in the higher triangles of the neck are affected. Although I cannot state that I have ever cured a patient who had neck involvement, I had one who went four years without recurrence above the clavicle, even though recurrence took place in the breast incision within three years. I, therefore, believe that life may be prolonged and rendered tolerable by operating upon patients who have involvement of the lower clavicular glands."

Halsted's statistics also show that where there was involvement of the axillary glands there were only 24.5 per cent of cures; so with axillary involvement the chances of cure are about one in four; without axillary involvement, four in five.

J. Collins Warren (Annals of Surgery, Vol. 40, page 813), says: "In seventy-two cases enlarged glands were felt in the axilla. In seventeen cases there was no axillary involvement. In eleven cases no record was made. Of the seventeen cases in which there was no infection of the axillary glands eleven are cures, that is, cures were effected in 64 per cent of the cases in which no glands were felt.

"Among the twenty-six recorded cures there are twelve cases in which there is a record of enlarged glands being felt in the axilla. In eleven cases no glands were felt and in three no record is made.

"Of the above seventy-two cases in which enlarged glands are recorded as present, there were eight in which the glands were also felt above the clavicle. One of these cases died of the operation. Six died of recurrence, but lived on an average of 19.8 months after operation. One individual lived nearly three years after operation. One is living with a recent recurrence eight years after operation. In all these cases a very thorough dissection of the posterior cervical triangle was made, but no permanent cure has been obtained."

So, then, there will be rare exceptions to the following classification of cases of breast cancer:

1. Those cases which are seen early, accurately diagnosed by a competent pathologist as cancer. This class offers the best chance

of permanent cure by radical surgery — from 50 to 80 per cent.

2. Those cases in which axillary involvement is observed, but without supra-clavicular node enlargement. This class gives possibly 25 per cent cures. Certainly some are cured, and the radical operation should be done. Of course, the smaller and fewer the lymph nodes enlarged in the axilla at the time of operation, the better the chance of cure. I do not think we are justified by the history of cancer of the breast in condemning all cases with axillary involvement to a hopeless prognosis.

3. Those cases who have ulcerated cancer, and who have infiltration of the pectoral muscles, will perhaps give a very small percentage of cures. This reduces the prognosis much more than enlargement of the axillary nodes does.

4. Those cases in which there is supra-clavicular enlargement of the lymphnodes offer very little or no hope of permanent cure, but the limits of life are considerably extended by extirpation.

5. Those cases of thoracic and abdominal infiltration (including the spread along lymph channels) and remote (blood) metastases are not curable by surgery, and are to be operated on only for palliative purposes such as will add to the comfort of the patient and her attendants or reduce the probability of complications such as infection in the ulcerative cases, or avoid the loss of vitality by hemorrhage or the constant leakage of serum.

In conclusion permit me to say that the ground I have taken against radical operations for small tumors of the breast not demonstrably cancerous has in no way to do with early investigation of such tumor by the most positive means at our command nor with the performance of extensive operation when cancer is demonstrated.

On the other hand, I do not wish to hold out undue hope in cases of extensive or advanced cancerous growths, but believe that the views of the profession at large in these cases are somewhat at variance with the facts.

146 *Eighth Ave., North.*

THE ANESTHETIST; A SPECIALIST.*

By C. O. ABERNETHY, B.S., M.D.,
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This is a day of specialists. Men are beginning to realize that there is a limit to what one mind can accomplish and are therefore confining their work to the special branches their professions. Thus we have men who are devoting their whole time to surgery, gynecology and obstetrics and study only the things which bear on their branch of work. This idea has been so much emphasized that the internal medicine man is rapidly becoming as much a specialist as the ear, nose and throat man.

Until recent years the subject of the administration of general anesthetics was not given the serious consideration that other branches of our profession were; the majority of the surgeons being content to turn the anesthetic over to the least experinced of their assistants while they themselves were perfecting their technique in operating; thus was neglected one of the most important branches of our profession. This was the time when the old cone method was in vogue and the surgeon would give the junior interne a can of ether and a cone and send him into the anesthetizing room to put the patient to sleep, thinking that an occasional death, struggling on the table, cyanosis and post-operative nausea were necessary evils which could not be avoided; and by the grace of God the patient was

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"narcotized" enough so that the operation could be performed. Then a reaction set in. The surgeons began to realize the importance of anesthesia and more attention was paid to the administration of it. The open drop method began to be used and the beneficial results ...ted. Slowly but surely the dangers and accidents due to the anesthetic were lessened. Realizing that this branch of the profession was so very important, the medical schools of the country began to establish departments for its teaching. Their attention being thus drawn to it, the profession began to demand ...hat anesthetists make themselves proficient, ...o young men began to specialize on this subject until today nearly every large hospital, all cities and most surgeons have their special ...nesthetists, who devote practically their whole time to the administration of anesthetics. The ...sults are that the percentage of deaths due directly to the anesthetic is becoming much smaller, struggling and post-operative nausea minimized, and the dangers greatly reduced.

The administration of a general anesthetic is not as easy as most of us think. There are a great many things to be taken into consideration which require the exercise of judgment and skill, which can only be obtained through study and experience. Just as much care should be exercised in the administration of the anesthetic as in the performance of the operation. One is as important as the other. The anesthetizer should have, and does have in properly rgulated cases, as much responsibility as the surgeon. Of course as a general thing the surgeon is responsible to the family, but the anesthetizer is responsible to the surgeon and has the whole management of his part of the work under his control. He has as a general thing to select the anesthetic given and he must fully realize that he is handling a dangerous drug and act accordingly. The patient must be anesthetized sufficiently to permit the performance of the operation, yet the border line must not be overstepped. The physiological and not the poisonous effect of the drug is the object in view.

The anesthetizer must realize that deeper anesthesia is required in some cases than in others. For instance, an abdominal section requires more than an amputation of a limb. The object of all anesthesia is to keep the patient in such a condition that the operators will not be interfered with and not to see how much or how far under the drug you can keep them. Some people seem to lose sight of this fact. In prolonged operations the anesthetizer's skill is displayed in keeping the patient on the border line, for the amount of drug given influences to a very great extent the dangers and the post operative nausea. To the anesthetizer is left the selection and amount of stimulation for the patient while on the operating table. He must display judgment in this particular, for upon this depends to a great extent the final outcome. The best rule as a general thing is to give as few stimulants as possible. The mistake often made is in waiting too long to begin the stimulation. The effects of an anesthetic are to retard the absorption of the body, and therefore all stimulants act more slowly than normal. So the best results are obtained by early stimulation. A man of experience knows better at what time to begin the stimulants and thus is more valuable than one less experienced. Again, he must know when to stop the stimulation. Many patients, I believe are over-stimulated on the operating table due to the excitement of the untrained anesthetist.

The old idea that an intense feeling of suffocation and therefore violent struggling at the beginning of anesthesia were necessary evils has become obsolete. The relic of barbarism which was practiced when three or four assistants held the patient down while the ether was poured into a closed cone and held over the face by force has been relegated to the past. Now the trained anesthetist quietly goes in with one nurse and by a few well-chosen words wins the confidence of the patient. It is very rare for a patient to take an anesthetic without being somewhat excited, and most patients are badly frightened and

dread what they call "going to sleep" more than anything else. When the anesthetist has quieted this fear he has done a great service to the patient and has made it much easier to administer the anesthetic. Never appear hurried, but remember that the patient is undergoing an ordeal which so far as he knows may mean death. It is not necessary to lose time, but work rapidly and quietly. If it is necessary to sacrifice anything, let it be time instead of the comfort of the patient. At times the surgeon may try to hurry the anesthetist, but the trained man will not let this effect him. His first duty is to the patient. The average time required for complete anesthesia with ether and the open drop method is from ten to twenty minutes, and this should be allowed in all cases.

Post operative nausea has been very much lessened by the trained anesthetist. We have tried many remedies for this condition and believe that it is influenced, to a very great extent, by the amount of anesthetic. The less ether given the less will be the nausea. The patients should be kept just at the border line and no further. It is much better to have them move or strain a little on the table than to be nauseated several days after the operation.

The greatest advantage to the surgeon in having a trained anesthetist is that he is relieved of all the responsibility of the anesthetic, his whole attention being directed to the operation, and naturally he can work more rapidly and skillfully. Again he can do better work because the patient is kept more evenly anesthetized.

Why have not more men entered this branch of the profession? One reason is that the surgeons have not in the past realized the importance of having a trained anesthetist. The interne was usually selected to administer the anesthetic while the less important work of assisting was given to more experienced men. It would have been decidedly better if the order had been reversed. Again the failure to refer patients has kept men out of this field. When a patient is referred to a surgeon a great many physicians want to give the anesthetic themselves, not realizing that probably the best interests of the patient would be subserved by permitting a trained anesthetist do the work. I do not think this is due to the fact that the physician wants to get the fee, but to the desire on the part of the patient to have the family doctor present when the operation is going on, but the profession is rapidly beginning to realize that one must be trained to give an anesthetic just as much so as the operator is to perform the operation. Again, competent men have refrained from entering this field because the fees were not sufficient. An anesthetizer cannot do very much outside work. He is at the call of the surgeon always, and when he works with more than one operator practically all of his time is consumed, therefore, if he does not get fees large enough to meet his expenses he necessarily must enter some other branch of the profession. This can be remedied by allowing the anesthetizer to charge a grading fee in proportion to the surgeon. Most surgeons allow their anesthetizer a smaller fee than their first assistant, forgetting the fact that the anesthetizer's duties and responsibilities are much more important than his assistant's. In fact, they are second in importance not even to the surgeon himself.

On account of this small fee nurses are being used in some places as anesthetizers. Women, when they are competent, make good anesthetizers, because they have more sympathy as a general rule than men, and have that ease of approaching a frightened patient which is such a great advantage. Again, they never hope to becom esurgeons, and therefore watch their part of the work instead of the operation. Still, before they are allowed to become anesthetists they should be required to take a course in medicine, because, on their judgment and skill, depends the life of the patient in many instances.

SOME DIFFICULTIES IN GASTRIC DIAGNOSIS.*

By W. H. WITT, M.D.,
Nashville, Tenn.

It may be appropriate to call attention to the distinctly unsettled state in which the definite diagnosis of stomach disease finds itself notwithstanding the rapid increase of our knowledge of stomach physiology and pathology in the last twenty-five years. With the material at our command, with the improved physical and chemical means of studying the functions of the stomach and the valuable help afforded by surgical procedures it would appear that our leading clinicians should be a little nearer together in some important lines than we now find them. When a physician requires an analysis of certain symptoms indicative of stomach trouble and tries to learn their significance in a specified case and applies to his so-called authorities for help, he finds himself confronted by the widest difference of opinion, and that, too, among men who appear to have had equal opportunities for observation, so that he becomes bewildered and discouraged. He is undecided whether he should put his faith in internists who rarely see the inside of a living man, or in the certain surgeons who, seemingly at least, are about to blow up some of our most settled notions of gastric diseases and are plainly telling these stomach tube authorities that they are just guessing. It is particularly to the difference of opinion on the diagnosis of peptic ulcer and the clinical significance of gastric pain, hyperacidity, periodicity of attacks and other phenomena that I wish to call attention. I shall speak of peptic ulcer without trying to distinguish between duodenal and gastric location, this being the tendency with both surgical and medical writers. I shall first quote Friedenwald, who writes the article on Secretory Neuroses in Osler's *Modern Medicine* under date of 1908. He bases his article largely on 2,000 cases of stomach trouble that appear to have come under his own observation in private and hospital practice. Eighty per cent of these he classes as neuroses and thereby justifies, in a way, the idea of the rarity of disease of the stomach put forth by Cabot and others of recent years. Friedenwald classes hyperchlorhydria and hypersecretion as neuroses, using the former term to identify those cases in which the hyperacidity continues only during the digestive period and the latter to those in which secretion after the stomach digestion has terminated. While holding to the functional origin of hyperchlorhydria very strongly, Friedenwald recognizes its relation to certain pathological conditions such as ulcer of the stomach and gall stone, but does not apparently attach much importance to their coexistence or at least seems not to recognize any etiological relation. Of these 2,000 cases he classes 542 as hyperchlorhydria and gives the following as the symptoms present in the clear-cut cases of that condition: "The subjective symptoms usually appear gradually and consist of eructations, heartburn, pain and burning in the stomach. The pain may vary from a severe pressure in the stomach to a very acute pain, and may extend into the back between the shoulder blades and pass under the sternum to the pharynx. The pain is not continuous, but appears at certain periods, with intervals of complete relief usually from two to four hours after meals, depending on the quality and quantity of the food. The pain is more quickly produced by light meals than by heavy ones and is usually relieved by the taking of food or by neutralizing the acid by alkalies. The severe pains are not uncommonly found after every meal, and vomiting is not frequent. A small meal is apt to give temporary relief and a large meal a more prolonged relief." While this is an abbreviated

*Read before the Nashville Academy of Medicine, June 14, 1910.

statement of the symptoms of hyperchlorhydria, I think it represents Friedenwald's idea of the essential phenomena that lead to a diagnosis. He says that such a case must be differentiated from ulcer, and this differentiation depends on areas of dorsal and epigastric pain and the presence of hemorrhage. His teaching is that food by combining with acid, water by diluting the acid, alkalies by neutralizing the acid give a relief from the pain of hyperacidity. He further says "the pain of ulcer is proportionate to the quality and quantity of food taken which is not usual in hyperchlohydria." As a further distinguished point he says "the pain of hyperacidity is relieved by alkalies while that of ulcer is not." He teaches also that relapses are very frequent in the neuroses. Note that he speaks of food giving relief in hyperacidity—the amount of relief depending on the quality and quantity. On the other hand, in ulcer he speaks of pain being produced by the food and does not intimate that relief will be given by food in a case of ulcer. To one who only goes to Modern Medicine for light, and surely one has the right to expect the best there—the way is clear; in acidity of nervous origin, food and alkalies give relief from pain. In ulcer, food causes pain, depending on the quality and quantity. Nothing can be more satisfactory than such a clear-cut statement.

In the Illinois Medical Journal, August, 1909, Dr. Graham of the Mayo service at Rochester writes at length of the diagnosis of peptic ulcer. He says the patient complains more or less severely of pain, gas, vomiting and sour eructations. He will say it follows meals, but it will be often found more exact to say it occurred before meals. Usually one to five hours after a meal the symptoms return, increasing in intensity, until the stomach is emptied in some way or the acid material is neutralized by some alkali, or, as is more usual, until food is taken again. More or less complete ease follows food and drink, the heartier the meal the more pronounced and prolonged the comfort; especially is this noticed in the early history and before complications have occurred.

Observe how closely Graham's words parallel Friedenwald, the one writing of the symptoms of ulcer, ulcer that he has seen in the living subject with the abdomen opened, the other writing of cases diagnosed by the ordinary clinical methods. Graham calls special attention to periodicity of attacks of illness as suggestive of ulcer, that is, periods of a few weeks or months with symptoms, followed by probably similar periods of relief. This feature of periodic disability showing the cycle of pain, food, relief—pain, food, relief, he regards as practically diagnostic of ulcer near the pylorus. He does not even require pain. He says "if gas, vomiting, distress or sour stomach is present and appears and disappears with characteristic regularity before meals and after meals, then ulcer should be strongly suspected, even in the absence of pain." He says further that this type of symptomatology may be approached in hyperacidity, hypersecretion, some appendiceal conditions, but there is no pathologic condition that so closely follows this train of symptoms as ulcer near the pylorus.

Naturally in the more chronic and complicated cases there are other features like great tenderness, hemorrhage, more or less constant pain that facilitate the diagnosis, but these latter are unnecessary to a diagnosis. Graham does not deny the existence of hyperacidity and hypersecretion as clinical entities, but he practically denies our right to make such a diagnosis where the symptoms of hyperacidity and its mode of relief occur periodically. And yet I do not doubt that the great body of physicians are accustomed to make this diagnosis in cases that give a clear history of periodicity. I certainly can recall some cases who have had these symptoms when on some prolonged nerevous strain, only to be entirely or greatly relieved when on a vacation and the usual tension of life relaxed.

The article on peptic ulcer in Osler's Modern

Medicine is written by Dr. Martin of McGill University. He says "the pain of ulcer is produced by food that is solid, but there are many exceptions, and food sometimes gives relief, especially albuminous food, if there is hyperacidity." In a general way Martin seems to hold that pain, rather than relief from pain, is to be expected by taking food, and speaks of the following as the essential features in the diagnosis: "The general condition, the history, the sex, pain after taking food, tenderness in the epigastrium, vomiting, hematemesis, dyspepsia and occult blood in the stools." Improvement by rest in bed and other proper treatment he regards as very suggestive of simple hyperacidity. Graham, however, as shown, teaches that periods of improvement are almost constant in cases of chronic ulcer. Martin evidently regards the diagnosis of ulcer rather difficult in most cases, or perhaps it would be fairer to say that many cases diagnosed by Graham as ulcer would not be so considered by him.

Moynihan stands out as a strong champion of the views set forth by Graham and probably puts the statement stronger than any one else that hunger pains mean duodenal ulcer, and when Dr. Hutchison writes entertainingly of hyperacidity and hypersecretion as neuroses, he boldly tells Dr. Hutchinson he does not know what he is talking about and invites him to Leeds, where he will open patient early in such a history and demonstrate to him that an ulcer is present. The teachings of Moynihan and Mayo have evidently influenced Dr. Osler, for in the new edition of his Practice of Medicine he intimates that they may be right and that internists have been caught napping. Moynihan writing in 1907 says: "Both Riegel and Ewald gave such meager descriptions of duodenal ulcer that it is quite certain that the characteristic clinical picture of that malady is unknown to them." Just where the truth lies, it may take much time and work, especially operative, to discover. Certainly the great mass of physicians are not yet prepared to say that hunger pain may not attend a pure secretory neurosis nor are they prepared to believe with Fenwick that continued secretion is always associated with organic diseases, ulcer, gall stone, appendicitis or other extra-gastric condition. Whether true or not, the profession is deeply impressed with the reality of secretory neuroses, and there are many circumstances that tend to confirm such a view. The interpretation of an excess of acid in the stomach, either temporary or as a continuous secretion, is often very difficult. In general diagnosis of stomach conditions, I think we shall find the quantity of acid present so inconstant that its estimation should never have very great weight in a diagnosis. Secretion varies so much in different conditions and we so often find low acidity where we expect to find high, and high where we expect to find low, as in cancer, that we may easily overestimate the value of a study of the secretion. A trustworthy history, which is by no means easy to obtain in many cases, a close scrutiny of the personality of the patient, and the proper tests as to stomach motility are better guides to a rational diagnosis. Therapeutic tests are of some value, but I would warn against drawing the wrong conclusion from improvement of digestive troubles from rest and change of scene. A marked improvement under such circumstances is not to be hastily judged as justifying the diagnosis of a neurosis and the exclusion of organic disease.

Worthington Flats.

INGUINAL HERNIATOMY WITH SPECIAL REFERENCE TO COCAIN ANESTHESIA*

By PAUL DEWITT, M.D.,
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The prime object of this paper is to deal with the operative technic of herniotomy, though it will not be amiss to take up a few of the general considerations of the subject.

An inguinal hernia is a protrusion of an abdonimal viscus into the inguinal canal. This may be indirect or direct according to the protrusion being external or internal to the deep epigastric artery. An enterocele contains intestine, an epiplocele contains omentum, while an entero-epiplocele contains both. A hernia is reducible when the contents can be returned into the abdominal cavity; irreducible when they cannot be so returned; incarcerated when the lumen of the gut is obstructed; strangulated when the blood supply is obstructed. Hernia is either congenital or acquired.

Of the predisposing causes, heredity plays a most important role, over one-third of all cases present a history of hernia in one or both parents. An inherited weakness of this region prepares the way for the exciting cause. The children of consanguineous parents show a peculiar liability. An extra long omentum predisposes by insinuating itself into nooks and openings separating them. Fat separates muscles and connective tissue, softens muscles by fatty degeneration and increases intra-abdominal pressure.

Hernia may develop at any age, from the intra-uterine state to extreme old age. Males, because of active habits, are affected six times more often than females.

Of the exciting causes, increased intra-abdominal pressure, especially sudden, is the most important. By a fall, twist or strain the muscles are not only actually ruptured, but are put upon a tension which decreases the size of the abdominal cavity forcing its contents through the weak and ruptured wall. Cough, constipation, and any hindrance to the urinary discharge produce increased intra-abdominal pressure and hence are exciting causes.

In foetal life the testicle lies in the lumbar region, there being a gradual descent through the inguinal canal until at birth it lies in the scrotum. The funicular process of peritoneum accompanies it in its descent and that portion occupying the inguinal canal normally becomes obliterated. When this obliteration does not occur, an open peritoneal sac remains into which the abdominal viscus protrudes, forming a congenital hernia. Coley and Bull found something less than 50 per cent of hernias in children to be congenital. While the congenital sac is very common, an actual protrusion at birth is very rare, but appears later, possibly after many years. A differential diagnosis by physical signs between congenital and acquired hernia is almost impossible except by operation.

The diagnosis of inguinal hernia usually is easy. The right side being suspected the patient stands facing your left, and with your left index finger invaginate the scrotum through the external ring into the canal and palpate the deep ring, noting its size. The patient coughs and a distinct impulse is felt at the deep ring. If not satisfied, examine the other side, comparing impulses and sizes. To examine the left side the patient faces to the right and the right hand examines. Frequently a distinct bulging may be seen upon coughing. In case the protrusion is hard to effect, have the patient lift a heavy weight or sit upon the edge of a chair with knees flexed and separated and strain as in the act of defecation.

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A complete hernia enters the scrotum, while an incomplete enters only the canal.

Direct hernia occurs about once in 17 cases, is never of sudden origin, and occurs in the old or debilitated. In this condition the protrusion is internal to the deep epigastric artery, directly through the transversalis muscle external to the rectus. Its diagnosis is easy, except in differentiating an oblique hernia with exceedingly large ring. Here the best guide is to insert the finger and locate the relation of the deep epigastric to the neck of the sac.

Indirect hernia must be differentiated from a retained testicle. The two are usually associated, however, the absence of the gland from its normal location is indicative, it gives no impulse on coughing, may be outlined, and squeezing produces a sickening sensation.

Hydrocele is flat upon percussion, transmits light, and gives no impulse upon coughing. In infants the light test must be used with caution, as the intestine is very translucent.

Occasionally the bladder protrudes into the canal and during herniotomy may be very misleading. A mass of fat bearing large blood vessels, appearing at the inner side of the neck of the sac, is bladder and must be pushed back and left alone.

First, in the management of hernia, must be considered general health and welfare. In children under four years a large per cent will be spontaneously cured by wearing constantly a properly fitting truss, hence surgery is not indicated except in large, unmanageable hernia and strangulation. After four years a truss very rarely cures. Here the annoyance and irritation of a truss retards physical development by prohibiting the natural exercises of play and work. The anxiety and thought that they are thus encumbered produce more or less nervous phenomena. Any healthy boy or girl over four years of age should not be permitted to start life with a handicap, hence operate on the youth to protect normal development.

Adults up to 50 years are in their prime when their portion of life's work must be done. A hernia destroys at least one-fourth earning capacity. Four laborers with hernia can produce the work of only three sound men. Look at the economic question. Hence operate on the adult to give him his full chance in life.

Over 50 years operate when the general musculature is good and senile degeneration has not begun. Many men up to 70 and even older are still active and fine subjects for herniotomy. Recently I operated upon a man 67 who has made as fine a recovery as any young man.

A properly fitting truss will hold most hernias reduced, but what are the results.

1. A loss of one-fourth earning capacity, partial loss of vital resistance through inactivity, and nervous phenomena through irritation.

2. Atrophy of muscle through pressure and through depriving the muscle of its intended function of support, resulting in a gradually enlarging hernia and an increasingly poor field for final cure.

3. And most serious—the ever present danger of strangulation. Any person with a hernia, however well reduced a truss holds it, however comfortable the truss is, carries constantly a potential death. By any sudden twist or strain, a knuckle of gut is liable to be forced beside the truss pad and strangulation occurs, especially is this true of small hernias, those usually considered dangerless. Large hernias are much less liable to accident.

Hence, all herniae, male or female, between the ages of 4 and 50, should be operated upon, the contra-indications being only those which hold good in surgery generally as tuberculosis and diabetes.

The problem is how to induce patients to submit to operation when they have before them the dread and horror of general narcosis, to say nothing of the dangers attendant thereon. Ether and chloroform both have their mortalities—about 1 in 10,000 for ether and 1 in 3,000 for chloroform. One death from ether during a heriotomy will stop all

but emergency hernia surgery in a community for years to come. The nausea and vomiting following general anesthesia are not only distressing to the patient, but serious damage is liable from strain on stitches. Only in cocain analgesia do we find the solution of this problem. I say without fear of contradiction that cocain in the weak solutions now used, guarded by morphia is absolutely without danger to life. The strongest solution used is 1-5 of 1 per cent, and this for skin and nerve trunks only, while 1-10 or 1 per cent is used for infiltration. It must be fresh, sterile, and hot, and prepared with physiological salt solution, which is isotonic with the blood. Many surgeons add adrenalin in small quantities. While it aids analgesia and produces a bloodless field, I rarely use it, because I am convinced the post-operative oozing is greater after its use.

Morphia grain 1-6 to 1-4 is administered hypodermically twenty minutes before operation. It is the physiological antidote to cocaine, and quiets the patient.

The preparation is the same as for general anesthesia, though a light meal is allowed to within an hour before operation. In the operating room quiet must prevail and calmness mark the surgeon and assistants.

All being ready, the line of incision is infiltrated wheal after wheal with a 1-5 of 1 per cent solution and a few punctures made into the underlying fat. The incision is made down to the aponeorosis of the external oblique, into which a few injections of a 1-10 of 1 per cent solution are made and the muscle opened in the plane for its fibres from above the deep to the superficial ring. Retracting the external oblique the ilio-hypogastric and the ilio-inguinal nerves will appear, which are infiltrated with a 1-5 of 1 per cent solution. Thus is used the nerve blocking of Crile, which renders analgesic the area of distribution of the nerves. The genital branch of the genito-crural nerve is sometimes found and, if so, is blocked and all further cocain dispensed with. When not located, simple infiltration suffices. The sac is now ready to be separated from the cord and surrounding tissues, and here comes a most valuable aid in having the patient awake—he coughs and the bulging sac appears. Following the line of cleavage, sharp dissection is made with blunt end scissors. Sharp dissection is best for two reasons—it lessens traumatism, thus lessening the danger of infection; and is more comfortable to the patient than the tearing and pulling with gauze covered fingers. The sac being freed well within the deep ring, it is opened. The contents are disposed of by returning intestine or ligating and removing omentum. I have seen 18 ounces of omentum removed without the slightest discomfort to the patient.

In the disposition of the sac McEwen's method of folding it upon itself with a zigzag stitch and suturing to the under surface of the transversalis was once very popular. Most surgeons now prefer a simple ligation with excision at the neck and return of the stump.

All masses of fat about the muscles must be carefully removed, as it hinders firm union and favors recurrence.

The methods of closure are innumerable Halsted removes part of the vessels of the cord and utilizes a reinforcing flap from the sheath of the rectus. Fowler obliterates the canal entirely by cutting the deep epigastric artery and bringing the cord directly through the external ring. Bassini forms a new canal. All doubtless have their special indications, but the operation as described by Ferguson, using the straight skin incision, appeals to me as being the most anatomic and practical. It replaces the cord in its natural bed, thus not endangering its integrity and leaves the tissues in their normal relations.

Bassini's procedure of transplanting the cord into a new canal between the conjoined tendon and external oblique has gained great favor, but the reports show a relatively large percentage of recurrences.

Coley's stitch is very important. He places one or two sutures in the internal oblique and transversalis above the cord. This reinforces the wall above the ring, preventing a recur-

rence through the weakened intercolumnar fibres.

Imbrication of the external oblique is often very effective.

Of suture material, kangaroo tendon is the ideal. Chromic gut No. 1 is next-best, or a large-sized iodized gut. Chromic No. 2 remains too long in the tissues, acting as an irritant inviting pus.

Suturing is accomplished as follows: Beginning below, pass a full curved needle from without inward through the conjoined tendon and from within outward through the shelving portion of Poupart's ligament. This route protects the iliac vessels. With interrupted sutures continue up to the deep ring, which is closed around the cord, having Coley's stitch above, leaving the ring just patulous enough to prevent constriction of the cord. These sutures bring the conjoined tendon to Poupant's ligament at least two-thirds of its extent, thus greatly reinforcing the canal and deep ring. The aponeurosis of the external oblique is imbricated with interrupted sutures, closing the superficial ring comfortably around the cord. Michel's skin clips are my preference for closing the skin. It is best to insert at the lower angle of the wound, a small drain of folded rubber tissue or silkworm gut, to allow escape of serum and oozing for 24 hours. In the dressing sufficient padding and pressure should be used to control oozing.

The time in bed must be at least three weeks; longer, I think, is unnecessary. A comfortable supporting bandage or spica had best be worn for a month longer.

Especially in strangulated hernia is local anesthesia indicated. Mitchell, in Bryant and Buck's surgery, says, "in strangulated hernia cocain is almost imperative." After opening the sac the contents can be inspected and hot applications applied indefinitely and if necessary a resection of the gut performed. The patient, already in shock, is not having shock added by general narcosis, and there is no need for haste.

My plea for cocain anesthesia is based on the folloiwng points:

1. Many patients are induced to submit to a cure who would not do so with general narcosis, and the anesthesia mortality is removed.

2. The integrity of the nerves is maintained, thus preventing muscle atrophy.

3. There is no vomiting, thus relieving strain on sutures and allowing early administration of food.

4. The danger of ether pneumonia is removed, and there is much less liability to renal insufficiency.

5. Every step in the operation is done with cocain that is carried out with general narcosis.

139 *Eighth Avenue, North.*

THE DIURETIC ACTION OF SPARTEINE.

By WM. DEB. MACNIDER, M. D.,

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Scoparius and its alkaloid Sparteine, like so many of the drugs that are used on account of their influence as remedial agents on the circulatory system and kidneys, have been perhaps unduly praised for their efficiency by some clinicians, while by others they have been considered useless, or of slight value.

Not only has the drug furnished clinical dispute, but its classification, dose and action have been variously considered by pharmacologists. For instance, Schmiedeberg[1] gives it a classification with Conium and Lobelia, while H. C. Wood[2] places it with such cardiac stimulants as Digitalis, Strophanthus and Convallaria.

The dose of the drug, both when employed

by clinicians and by pharmacologists for experimental purposes, varies within wide limits:

H. C. Wood, gr. ¼—11.

A. R. Cushny,[5] gr. 11. or gr. 1-16—XII in twenty-four hours.

Geo. F. Butler,[4] gr. 1-20—11.

Lorald Sollman,[7] gr. 1-10—½.

R. G. Wilcox,[6] gr.—1-5.

Samuel O. L. Potter,[7] gr. 1-16—½.

H. A. Hare,[8] gr. 1-20 or gr. 11—IV.

Jno. V. Shoemaker,[9] gr. 1-6—11.

David M. Culbreth,[10] gr. 1-6—½.

Such a variation in dosage would apparently indicate either that the experimental action of the drug has not been properly studied and correlated with the amount employed, or that some preparations of the alkaloid are physiologically active, while others are more or less inert. The latter suggestion undoubtedly explains some of the variations in dosage as well as the differences of opinion which are held concerning the drug's therapeutic value.

The value of Sparteine when administered hypodermically for its action on the heart and vessels, as well as for its diuretic effect, is at the present time a subject which has not been established with any degree of unanimity of opinion either among clinical men or among pharmacologists, who are primarily interested in the drug from an experimental standpoint. That such a difference of opinion exists, even after rather extensive work on the subject, may be seen from the following statement made by H. C. Wood. In considering the action of Sparteine on the circulation, he states that: "Although the subject of the action of Sparteine on the circulation has been investigated by Loborde, Griffe, Garand, Masius, Gluzinski, Cerna, A. R. Cushny and S. A. Matthews, the results reached have been so discordant as to make their reconciliation at present impossible." Here again, we must believe that when investigators of the type mentioned above obtain such different results something must be wrong with the dose employed, the method of administration, or the purity of the drug.

By far the largest amount of experimental work on Sparteine has been in regard to its influence on the circulatory system. Only a few investigations have been attempted to determine its value as a diuretic.

One of the best known Southern surgeons constantly employed this drug for the relief of an anuria or to increase the flow of a greatly reduced urine, the condition developing following surgical operations. His results are fairly constant. Although this clinical observation has never been substantiated by an experimental investigation, it seemed wise to attempt to do so. In the experimental investigation which was undertaken the dog was used. Animals varying in size between 5-8 kilos, healthy and well nourished, were selected.

TECHNIQUE.

The experiments were performed under complete ether anesthesia; the ether being preceded by a hypodermic injection of 0.5 cc. of a four per cent solution of Morphine Sulphate per kg. of body weight. The use of morphine through its action on the central nervous system lessens the amount of the general anesthetic. In all experiments where kidney activity is to be determined it is best for the reason given, to employ morphine prior to the use of the anesthetic. In all, five animals were used; the technique was the same in each case.

With the first four animals Sparteine from the same source was employed. In the last animal, although the Sparteine was administered in the same way, it was used in larger doses and its source was different.

The operative technique consisted in first doing a tracheotomy, inserting a glass tracheal camula and connecting this by means of a rubber tube to a simple form of respiratory tambour. The tambour was so arranged that the respiratory movements were recorded through the medium of a uniting point on the revolving drum of a kymograph.

The corotid was exposed and a glass corotid canula tied in the vessel. Leading from the canula was a rubber tube, which connected

the vessel with a mercury manometer. Through this arrangement it was possible to observe the blood pressure of the animal throughout the experiment. The manometer was furnished with a float for the mercury column and a uniting point, so that a graphic representation of any blood pressure change was recorded on the revolving drum of the kymograph. For convenience the blood pressure tracing was made just below the respiratory tracing. Plates I and II.

One femoral vein was exposed and a canula inserted. The canula was connected by means of a rubber tube to a burette, graduated in one-tenths of a cubic centimetre. Through this arrangement the Sparteine was given intravenously and the dose accurately determined.

The final step in the operative technique consisted in making an incision five c. m. long, beginning at the symphisis pubes and extending upward. Through this incision both ureters were delivered and small glass canulas tied in. Leading from the canulas were rubber tubes, which delivered the urine into glass receptacles placed between the animal's thighs.

With the arrangement as above detailed it was possible, in the first place, to give an accurate amount of the drug in exactly the same way in each instance. Secondly, as a result of the method of administration employed, all of the drug given must have had its effect, as no disturbing factor, such as the liver, which might decompose and render inert such a substance, had to be taken into consideration. Lastly, all changes in the heart rate, respiratory movements, and blood pressure could constanly be observed.

The results obtained from the first four animals were fairly constant. Plate I.

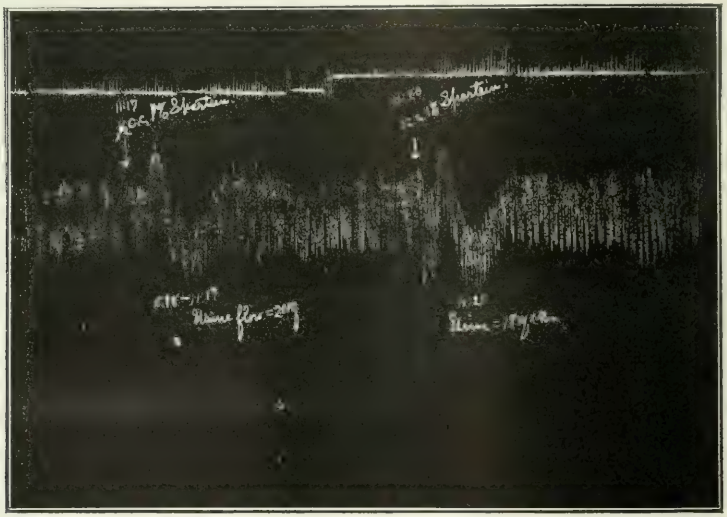

PLATE I. EXPERIMENT NO. 3.
Read from left to right.
Effect of Sparteine Sulphate in the dose of 0.5 cc. and of 1.0 cc. of a one per cent solution on the blood pressure of the dog.

With these animals the Sparteine was given intravenously and in a dose varying between 0.5 —1. cubic centimetre of a one per cent solution of the drug in a 0.9 per cent salt solution. In two instances the dose was smaller, but in no case was the amount administered over 1.0 cubic centimetre of a one per cent solution.

A study of the tracings from the first four animals lead to the same deductions. A portion of the tracing from animal number one shows the following changes: The normal blood pressure of the animal was 150 mm. of mercury, heart rate 72 per minute, respirations 55 per minute. The urine flow was 18 drops per minute. Following the administration of 0.5 cubic centimetre of a one per cent solution of Sparteine, the blood pressure rose to 160 mm. of mercury, but almost immediately fell to 145 mm., both the rise and fall occurring within the same minute. With the rise in pressure there is no quickening of the heart, so that the rise could not be ascribed to an increased output of blood from the ventricles. The rise in pressure, though quite transitory, might be explained either through a central action or through a peripheral action directly on the vessels. In the experiments, the central action of the drug was not excluded by eliminating the vasa-motor center. Therefore, the location of the action cannot be determined. Such a transitory rise in blood pressure, immediately followed by a like fall, is a common occurrence following the introduction of fluids into a vessel and likely has no specific interpretation.

After intervals of two minutes and three minutes, respectively, the Sparteine was repeated, the dose being increased to one cubic centimetre of a one percent solution. With each administration similar changes to those just described developed in the blood pressure record, with practically no change in the heart rate or in the respiratory movement.

Following the first injection of Sparteine the urine flow increased to twenty drops per minute, but within three minutes the flow had returned to its normal rate, e. g., 18 drops per minute. This rate remained constant for forty-five minutes, although the Sparteine in 1 cc. quantities was administered every ten minutes.

A survey of the results obtained with first four subjected to the action of sparteine are aparently as follows:

1. Sparteine given intravenously in the dose of 0.5 cc. or of 1 cc. of a one per cent solution causes a very transitory rise in the blood pressure which is quickly followed by a fall in the pressure equal to, or exceeding, the rise. Following this the blood pressure curve returns to normal. For reasons above given this change cannot likely be considered specific.

2. With the doses above mentioned practically no change takes place in the heart rate or in the rate or extent of the respiratory movements.

3. There is no evidence of a diuretic action.

In the experiments on the fifth animal, the technique was the same as that for the first four. The Sparteine was administered in the same way, but a larger dose was employed, four cubic centimetres of a one per cent solution. The Sparteine was not from the same source. The results of this experiment are as follows: Prior to the use of the drug the blood pressure was 120 mm. of mercury, heart rate 105 per minute, respirations 58, and urine flow 16 drops per minute.

Immediately following the administration of 4 cubic centimetres of the Sparteine solution there is a rather abrupt rise of blood pressure similar to the rise obtained in the first four animals, but differing in the subsequent changes in the pressure curves of these animals in that there is no fall in the pressure, but a rise which persists, in two minutes reaching 128 mm. of mercury, in three and one-half minutes reaching 136 mm. of mercury, and within ten minutes reaching a pressure of 152 mm. of mercury. At this point the pressure remained constant with but very slight fluctuations for thirty-seven minutes, and then very gradually declined.

With the rise in blood pressure the heart rate is slightly accelerated. The respiratory rate is but little changed, while the respiratory movements become stronger.

Next to the blood pressure changes of the urine flow is of most interest. It shows an increase in rate from 16 drops per minute to 29 drops a minute, at which time it will be noticed that the blood pressure has undergone a considerable rise. The flow is reduced from 29 drops to 24 drops, but continues at this latter rate throughout the experiment.

SUMMARY OF THE RESULTS OBTAINED FROM EXPERIMENT NO. 5.

1. In this experiment Sparteine from a different source from that which was used in the first four experiments was employed.

2. The method of administering the drug was the same in all the experiments, but in experiment No. 5 the dose was increased from a 1 cc. dose to one of 4 cc.

3. In experiment No. 5 there followed the use of Sparteine a fairly rapid rise in blood pressure from 120 mm. of mercury to 152 mm. of mercury. This rise in pressure persisted.

4. With the rise in blood pressure the output of urine increased from 16 drops per minute to 24 drops per minute. This increased flow of urine persisted.

5. In experiment No. 5 the blood pressure changes and increase in flow of urine differ from the results obtained in the first four experiments. Experiment No. 5 differs in no way from the other experiment *except* that Sparteine from another source was used and that the dose of Sparteine was increased.

6. This noticeable difference may be due to either a more active preparation of Sparteine or to the larger dose employed.

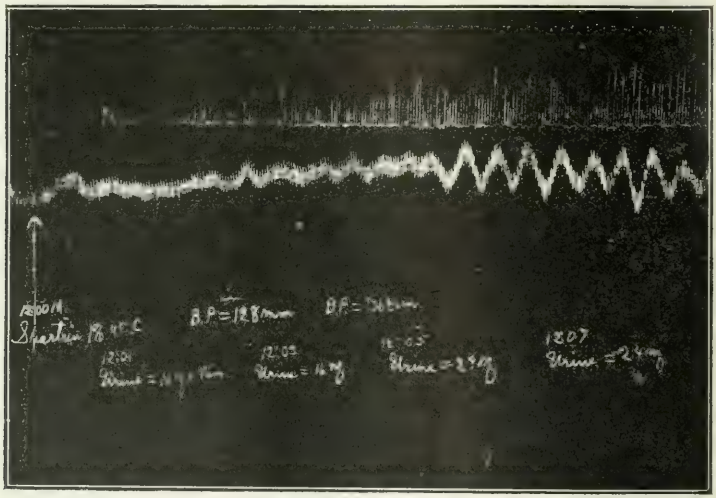

PLATE II. EXPERIMENT NO. 5.
Read from left to right.
Effect of Sparteine Sulphate in the dose of four cubic centimetres of a one per cent solution on the blood pressure of the dog.

CONCLUSIONS.

An active preparation of Sparteine used in a sufficiently large dose produces a rise of gen-

eral arterial pressure. Following the rise in blood pressure there is an increase in the output of urine,which is likely due to an increase of local blood pressure in the kidney. Following surgical procedures, where the amount of urine is greatly reduced, or where an anuria has developed as a result of low general arterial pressure, the amount of urine may be increased and the anuria relieved through the action of Sparteine on general blood pressure and indirectly on the local kidney pressure, raising the latter and rendering the kidney functionally more active. Lastly, a larger number of experiments should be undertaken for a conclusive proof that the diuretic effect of Sparteine depends upon a sufficiently large dose.

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TUBERCULAR MENINGITIS. Case Report.

By JOHN OVERTON, M. D.,
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Boy, white, age 10—Tubercular Meningitis.

Previous history: Had pneumonia six years ago. Recovery apparently complete. Was subject to frequent attacks of croup. Was reared on cow's milk. No history of any glandular enlargement. Otherwise, had always been a fairly healthy child, though not fleshy or very strong. Was of a very nervous temperament, but mentally bright, his head being larger than normal for child of his age. Though a child of physical courage, apparently, he would at times become much excited through anticipation of some imagined ill fortune that he feared was going to befall the family, or some personal injury that he dreaded some of the school children intended inflicting on him, all of which ideas seemed to have no foundation outside of his own imagination. For a week or two before his illness it was noticed that he had not been as well and active as usual, and at times had complained of feeling badly. Suffered from lassitude and occasional headache. On Thursday, March 10, his present illness began. He had headache, was restless and at times a little flighty, and vomited after being given medicine. At first there was no rigidity of neck or retraction of neck, and Kernig's sign was not examined for. During the first week of illness he was considered to have typhoid fever. Meningitis was then suspected, and consultation asked for. Drs. Wood and Dixon saw the case and made diagnosis of tubercular meningitis. Puncture was done on the 18th by Dr. Dixon, and a clear fluid started out under a great deal of pressure. Was stopped for some reason and only about 8 cc. were obtained. On examination of this fluid by Dr. Litterer, both by smears and by cultures, nothing but a predominating Lymphocytosis was determined. Had a quiet night; seemed to be doing better next day. Was brought to town on the 20th, temperature 99 to 100, pulse irregular and generally slow. Mental condition seemed good, and he complained of the light when shade was raised. No other condition was found on careful examination. Puncture was done, 40 cc. of clear fluid was drawn, examination of which revealed nothing further. A number of guinea pigs were inoculated from this fluid. The boy had a very restless night, and frequently

screamed out. Was not quieted by the bromide mixture he had been in the habit of taking. On Monday mental condition was bad. He lay stuporous most of the time, and recognized only his mother. Had good results from bowels and bladder, following enema. Would take very little water or nourishment. Puncture done, about 60 cc. of fluid withdrawn. Had a good night under the influence of morphine. First dose of tuberculin given. On Tuesday was brighter mentally, could look at the light without discomfort, and there were no pupillary changes. A full quart of an enema solution was retained, and there was also retention of urine. Eighty-four cc. of clear fluid withdrawn, and patient catheterized and a pint obtained. In the early part of the night a prolonged free sweat. Bowels and bladder acted, following enema. Was very restless during the night, despite the morphine. Drank water very freely and took nourishment well. Bowels and bladder acted once involuntarily. About 6 A. M. he took some nourishment, was given morphia, went to sleep and was sleeping at 9 A. M. Pulse 80 and regular, breathing normal and sleep natural. On March 22nd neck was slightly rigid, but not retracted. Was still sleeping in the afternoon, but on being aroused seemed to understand and talked rationally, though he would scream out, if handled much. Temperature not high, pulse very good, and control of deep reflexes present. Pupils equal and reacted promptly to light. Ninety-six cc. of fluid were withdrawn, under anaesthesia, after which he slept an hour and a half, but later became restless and would frequently scream out. Did not rest well during night, and was very easily aroused by taking his temperature, etc. Next day temperature was up to 100½. His pulse was good, expression natural, and did not scream any. Temperature—99 at 4 P. M., was apparently doing very well, complained of no headache, so puncture was not done. Was quiet and slept most of the night. Took his nourishment fairly well. On March 25 was quiet, talking to himself a great deal and occasionally reaching out after imaginary objects. Temperature 100½, pulse 85 to 100. When aroused talked fairly well, and took nourishment. Puncture and 96 cc. of fluid withdrawn, and second dose of tuberculin given. Restless during night and next day. Sunday restless and talkative. Puncture done. 100 cc. of fluid withdrawn, apparently not under a great deal of pressure. Restless and talkative during day and night, and on Monday was very restless, talking continually. Pulse and temperature a little up. Another physician called in and doubt cast upon the diagnosis, he trying to explain it on the ground of some functional brain disturbance. However, did not know how to account for his temperature and history of the past two weeks. After 60 grains of chloretone and 10 grains of trional child became quiet and finally went to sleep at 3 A. M. and slept all the next day. Pulse was 120 and quite full in character. Respiration normal, pupils equal, but did not appear to react. Color was not so good in the morning, but became natural in the afternoon. Bladder became very much distended and had to be catheterized. Consulting doctor again called and tried to determine the cause of the child sleeping so long, and felt that it was due to the prolonged effect of the hypnotic. However, his pulse, respiration and temperature were all increased. Did not arouse at all from his stuporous condition during the night, and lost control of the deep reflexes. Next day his condition was unchanged, except coma seemed to be deepening. People decided to change treatment, and an Osteopath was called in. Condition steadily grew worse, pulse going to 150 or above, and temperature reaching 104 before death, which occurred several days later.

Of the six guinea pigs inoculated by Dr. Litterer all developed tuberculosis. Three were inoculated subcutaneously and three intraperitoneally. In all evidence of infection was found in area injected. The first pig was killed at the end of the third week and showed positive evidence. This was a very early de-

velopment and unusual. Two of the pigs were allowed to die and a general miliary tuberculosis was found.

This was quite an interesting case, and I thought it worth reporting for the purpose of calling attention to the apparent hopelessness of the condition when advanced to such a stage, more especially to say that recently a small number of recoveries have been reported and to add that if we shall in future hope for such good fortune we must be very alert in trying to discover evidence in its incipiency. Looking back at the history of case I would think that the excited condition of child's mind, with his frequent fears, were worthy of special notice, and believe that if puncture had been done six months or a year before and the nature of trouble determined he would have had a fair chance for recovery.

120 Eighth Avenue, North.

THE PSYCHONEUROSES AND THE DOCTOR'S RELATIONS TO THE PUBLIC. THE FALSE ASSUMPTION AND INUENDOS OF CHRISTIAN SCIENTISTS.

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m. assoc. soc. clin. de med. ment., etc.

It is not profitable at present to thrash a dying horse by entering into a controversy regarding the demerits of Christian Science. But some assertions recently made call forth a protest. The meaning imputed to the paper* of the author, is an instance.

In no part if this paper was it assumed, as was insinuated, that "the work of perfecting human thought should be left to trained medical experts." It was held, however, that none but trained medical experts are competent to counteract the psychopathological results of the manifold factors which interfere with human health; for, save Christian Scientists, even the most pronounced dualists admit the interaction of what it pleases them to divide into mind and body; and it is not conceivable that those who have not conformed at least to the minimum amount of study required by law for the safety of the community can, without danger, be entrusted to dabble with the disorders of a body of whose understanding they have not shown evidence.

Moreover, so far from it being generally admitted that the application of Christian Science teachings has proven beneficial to the health, morals and happiness of its students, the common sense of the community is at one with the monist and naturalist, and is only prevented from vetoing the practice of the cult by the habit of religious tolerance of practices so widely divergent as those of Theosophy, Mormonism, Spiritualism and the numerous minor bodies which have from time to time arisen and have not been forbidden until the community ascertained that their practices were in gross violation of the moral code.

As to the healing practices assumed by the Christian Scientists, they are tolerated in conformity with a policy which permits Homeopathy, Eclecticism, Osteopathy, Cheiropraxy, etc., to flaunt themselves side by side with the medical art as practiced in other civilized countries. It is only the gradual enlightenment of public opinion, which we owe largely to concerted action guided by the American Medical Association, which has until now protected the public from optometry as a licensed exploitation for pecuniary gain by another interference with the rights of human health.

*"Psychoprophylaxis in Childhood (in "Psychotherapeutics"). The Gorham Press, Boston and Toronto, 1910. (Also Journal of Abnormal Psychology 1909).

The medial profession has not arrogated to itself a monopoly in the direction of human thought, but it is beginning to see how necessary are its services in the preservation of psychic health and of sanity of mind, and that the preventive measures it is learning to manage are not only those concerned with the body. My paper, indeed, was an attempt to indicate, in the necessarily fragmentary manner of a pioneer, some of the lines upon which psychoprophylaxis could be exercised by the physician in conformity with the physiological laws in which science has formulated man's acts, of which psychology is now a well recognized branch. By thus learning the medical man will supplement, by a mental orthopaedics, clearly and expressly, what he has formerly done only vaguely and implicitly, both the pedagogue and the priest, whose studies have not given them the opportunity of viewing the whole man in the objective manner made necessary by medical art. Enlightened teachers and clergy have always in part realized the physician's role in the formation of character; but it is only since studies of morbid psychology have given us exact knowledge of so many hitherto unsuspected determinants of conduct, that it is possible to realize the far-reaching function and imperative need of psychotherapeutic experts. It is to them that we, in the twentieth century, must look for a body of applicable concrete knowledge which shall prevent disorders of mind in a manner comparable to that by which the patient labors of sanitary science in the nineteenth century are preventing the disorders of the body.

The phenomenon of Christian Science we regard as an expression of human need for this very knowledge; but cooperation from the Christian Science cult is as far from practicable as would be cooperation with cenesthopaths, who deny the existence of the bodily organs, to which false premise they are so wedded that not all the horrors of gastric cancer itself would compel them to acknowledge a stomach.

Hence, however well meaning is its followers' study of the "science of man," we cannot regard as serious that doctrine which ignores the objective basis of common-sense upon the postulate of an ill-conceived Berkleian dualism; and we certainly do regard as injurious the influence of a doctrine which prevents the acquisition of the power over self and environment proceeding only from a clear realization of the nature of each, and which, by blinding man to the unpleasant, gives only the false security of the ostrich, which conceals its peril by burying its head in the desert sand.

1758 *K. St., N. W.*

UNCINARIASIS IN TENNESSEE.

By NEWTON EVANS, M. D.
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It has seemed to me that it might not be without interest to publish the accompanying map showing the distribution in the different counties of the state of the probable place of origin of the cases of uncinariasis which have come to light through the systematic examination of several groups of individuals, mostly children, residing in Tennessee.

By noting the location of the black spots it will be seen that there have come to my notice 44 cases of the infection, their origin being distributed in 29 different counties. A larger number of these are located in the eastern half of the state than in the western. This may possibly be explained by the fact that throughout the South the infection is more prevalent in the mountains and hilly districts, and in the low sandy regions than in the clay lands. As Tennessee has no low sandy district of any great extent it probably is more

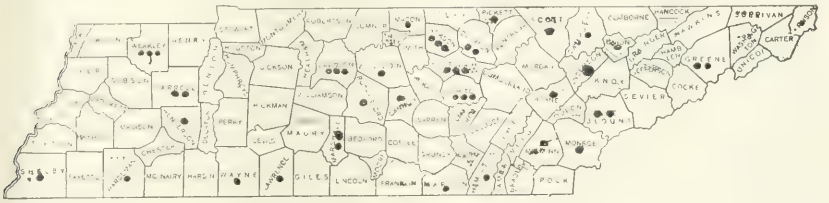
prevalent in the eastern or rougher part of the state.

For the most part the subjects examined have been children residing at the State School for the Blind, at the Tennessee Industrial School, and at one of the orphanages, all of which are located in Nashville. These collections of children provide a very favorable and convenient means of readily determining the distribution of the hookworm infection in the State, as the children are collected from all portions and from each county of Tennessee. There is no question that sources of these cases of infection were in the localities from which these children came, and not in the institutions where they are now living, under proper conditions of sanitation.

Of the 122 children, 74 were partially or totally blind. Taking these blind children as a class only 24 per cent were infected; while of the remaining 48, 42 per cent were infected; showing at least that the blind children were not more exposed to the infection than those children who are not blind.

The method of diagnosis in all cases was the microscopic examination of the feces. Our method of preparing the feces for microscopic examination follows very closely that of Dr. Bass,* of New Orleans, published in the Archives of Internal Medicine.

Personally I am convinced that the only method of making an exact and satisfactory diagnosis, at least in the great majority of cases, is by this microscopic examination of



Showing the distribution of cases of uncinariasis in the counties of Tennessee. Each round black spot represents one case.

In all, 122 children were examined. Of these, 38 or 31 per cent, were found to harbor the *uncinaria americana* in larger or smaller numbers.

The other six cases, making 44 in all, indicated upon the map, came from other sources, partly from the examination of a number of medical students, who as a whole showed a rather high per cent of infections in harmony with the findings in all the southern medical colleges and other schools where such examination has been made. Two cases occurring in children in Putnam County were reported to me by Dr. Scott Farmer, of Cookeville.

the feces for the free ova, except, of course, where the adult parasites are observed in the fecal discharges after the administration of thymol or other appropriate antbelmintic.

This very large percentage (over 30 per cent) of uncinariasis in children residing in Tennessee shows beyond doubt the great frequency of this infection and its wide distribution throughout the state. The interest in this disease should increase rather than wane. The statement made by Dr. Harris, of Atlanta, about ten years ago that "Uncinariasis is the most common infectious disease of the South" should be thoughtfully considered.

*C. C. Bass, "Mild Uncinaria Infection," Archives of Internal Medicine, Vol. III., p. 446.

SELECTED ARTICLES.

VOLVULUS OF THE SMALL INTESTINE AS A LATE CONSEQUENCE OF APPENDICITIS

(Translated for the Southern Medical Journal from the June issue of the Deutsche Zeitschrift fur Chirurgie, by Dr. W. A. Bryan.)

By DR. EMIL HAIM, BUDWEIS.

While I intend to write in this article concerning obstruction in the small intestine due to appendicitis, still I do not refer to the numerous observations laid down in the literature in which sooner or later, in the course of appendicitis, or after the performance of an operation changes which through the previous peritonitis are considered resulting from it through the formation of bands and adhesions a partial intestinal obstruction has resulted. These cases certainly have their significance, definite and not to be underestimated, for the judgment of the possibilities of the course of appendicitis, and its prognosis relative to their genesis and the explanation of the diseased symptoms; they offer, however, no difficulties, and therefore are of no further interest.

I wish here to deal with a single diseased condition, namely, volvulus of the small intestine, which I myself, have observed twice following appendectomy. Moreover, I have at my disposal four other cases almost exactly identical with my own.

Volvulus of the small intestine is, in and of itself, not a frequent condition. In the year 1900, Richter collected in all, ninety-four cases of volvulus of the small intestine, a proof that this form of disease does not belong to those classes which are met with every day. Even now isolated cases are frequently published, since the interest in this condition is great.

The cases observed by me are as follows:

Case 1. (Observed in Lotheisson's division in Kaiser-Franz-Josefs-Spital in Vienna and placed at my disposal through his friendship)—Carolinae D, 23 years old, servant. Admitted the 15th of August, 1905. Until Jan., 1903, was always well, but at that time she was admitted to a skin clinic on account of a skin eruption; then admitted to the surgical clinic for appendectomy (May, 1903). In September of the same year she was operated on a second time, but was considered an hysteric. Since three weeks cramps in the abdomen, and vomiting has occurred since the afternoon of August 15th, 1905.

Past Condition—Patient looks fresh, tongue moist, thorax normal, two scars on the right side of the abdomen, one at the outer border of the rectus, the other three finger-breadths further out. Genital apparatus normal. Abdomen soft, not painful. On the 15th pains began in spite of the moist tongue and movement of the bowels; the vomiting persisted. The pulse rose to 126, temperature to 38.6 C. Considerable pains in the abdomen with no demonstrable dulness.

Operation was done (Dr. Haim). Median laparotomy above the symphisis; a large quantity of serosanious fluid was found. The gut was eventrated, showing a loop of ileum which was distinguished by an especially long mesentery, which showed rather thick and numerous scars (former axes of rotation?). This loop was rotated 360 degrees to the right and was fixed in this position by slight adhesions. The gut itself was an intense blue with numerous hemorarhagic spots in the serosa as well as in the mesentery, but still glistening. After separation of the adhesions the gut was rotated back, the loop wrapped in a layer of iodoform gauze, a tampon was introduced and the incision partly closed with suture.

Saline infusion, August 17, pulse 156, of low tension, no fever. She became increasingly weaker and died in 16 hours.

Case 2. John C., 30 years old, a plasterer's assistant. Claimed to have been well prior to present condition. In August of the year 1907 he passed through an attack of appendicitis, which ran its course with fever, severe pains, as well as inflammation of the bladder and lungs. After ten weeks he was well. In August, 1908, a second attack; he had fever fourteen days, as well as severe pains in his abdomen. Recovery occurred again, but the patient did not feel that he was entirely well at this time. Wherefore he was admitted to Hohenegg's clinic in January, 1909, where his appendix was removed on the 28th of January. On the eighth day a skin suppuration is said to have taken place, which disappeared under the application of thermophore compresses after removal of the skin sutures. After this the patient felt entirely well. On th 19th of August, 1909, he became sick after a strenuous bicycle tour. He had to vomit, had very severe pains in his abdomen, as well as absolute obstipation. After this there was vomiting but no fever; this condition continued through the next day. I saw him August 21st, patient impressed me as being very sick, pulse 120, easily compressible; facies Hippocratica. Vomiting, regurgitation and absolute stoppage of feces and gas occurred. Patient complained of severe pain in the region of the appendix, breathing was accelerated and the abdomen tightly distended with gas, also a slight dullness in the flank, with fairly marked sensibility to pressure over the whole abdomen. I diagnosed intestinal obstruction and,

since the nearest hospital was far away and difficult to reach, proceeded to do the operation in the patient's home, a little low farm house.

Morphine-chloroform-ether-narcosis. Laparotomy. Incision into abdomen in the middle line, from naval to symphisis: a large quantity of bloody, cloudy serum escaped on opening peritoneum. On introducing the hand towards the caecum, a bloody, red-tinged infarcted loop of small intestine, tightly distended, covered with flecks of fibrin, was found, and it together with its mesentery was twisted 360 degrees in the direction of the hands of the clock. It is the lower end of the ileum. Already slight agglutinations were present, but in spite of them the loop was easily unwound, whereupon it was replaced into the cavity. The abdominal wall was completely sutured in three layers, convalescence was uneventful.

In the first weeks slight symptoms of stenosis were still present, which are now gone, so that patient at present feels entirely well.

Case 3—The third case is taken from Nordmann. I am under obligations to Prof. Nordmann also for a complete presentation of this case-history, as well as Case 4, not heretofore published, for which I also desire to express my thanks to him.

Otto Sch.—Fifteen years old, admitted No. 808, the 3d of April, 1908, to the 17th of April, 1908, died. Previous history—Two attacks, became sick three days ago. Opium. Condition: Temperature, 38.3 C., pulse, 124. Abdominal wall as rigid as a board, painful everywhere. Operation on April 3, 1908, Nordmann. Everywhere much pus, appendix retrocoecal, empyema; extirpation. Abdomen was filled with thick pus and on account of this, counter openings were made in abdominal cavity at various points. Cavity was irrigated, drainage, tampons.

Infection—diplococci. Course good at the beginning, ileus on the 28th day. Enterostomy under local anaesthesia, death.

On section a loop of small intestine about 70 cm. above the ileo-cecal junction and about 50 cm. long was found rotated on the mesenteric root 180 degrees in the direction of the hands of the clock. Abdominal cavity clean.

Case 4. (Kindly placed at my disposal by Prof. Nordmann).—Nordmann operated in summer of 1908 in the Britzer Hospital on a man 19 years of age who had a completely encysted perityphilitic abscess, von Rehn's method. The free cavity was packed off on the medial side of abscess.

Abscess emptied with dry sponges, appendix removed, abscess cavity drained, abdominal wall sutured. No irrigation, no eventration. Patient did very well for eight days, then vomiting set in which gradually became feculent. Feces and flatus obstructed. When Nordmann saw patient he presented the same picture as in previous case, abdomen soft, no visible loops, ghastly expression. Enterostomy was done on a distended loop of small intestine after blunt opening of wound, death in collapse.

Section, small intestine about one metre above the valve, about eighty centimeters long, turned about two hundred degrees to the right, not gangrenous, but cyanotic just as in the preceding case. The rotation here too was in the direction of the hands of the clock.

Case 5—Giertz's case, No. 30, girl, born 1881. Patient had been previously well. On Sept. 27, 1892, vomiting and pain over whole abdomen, on 28th of September frequency of symptoms increased; pains were localized in the right side. On 28th, her condition was as follows: Temperature, 39.2 C., pulse, 150. Greatest sensitiveness toward the back at the upper border of iliac crest, slightly less in the region of McBurney's point. On pressure at the epigastrium or to the left of the middle line, pain was referred to the region of the caecum. Operation on the 28th of September. The appendix lay on the outer side of the ascending colon posteriorly, just below the right lobe of the liver. There was pus around the apex of the appendix. Appendix was bent to an angle at three points, its mucous membrane gangrenous in spots. Two perforations at the apex, where an enterolith lay. Irrigation, tamponade with iodoform gauze, partial suturing of the wound. After the operation, collapse lasted some hours.

On the 30th of September diagnosis of mechanical obstruction was made, and on the 1st of October another operation was done.

Findings: Volvulus of the small intestine, a half rotation. After the operation the gut became involved again, and the patient died 16 hours after the operation.

Case 6—Giertz's case, No. 471. Patient was operated on four days after the beginning of illness. An abscess was found in the upper part of the pelvis. On account of absolute intestinal atony, a fistula was established in the caecum on the first day. There was stercoraceous vomiting on the two following days, which was controlled by irrigating the stomach, nothing passed through the fistula. Other fistulae were established at the flexure and in the loops of small intestine, all without effect. After three days persistent stercoraceous vomiting, a second laparotomy was done, new abscesses were found in the neighborhood of that found at the first operation. A loop of ileum was twisted on itself in the true pelvis. After the operation, persistent ileus.

If we briefly collect the history of the patients, then, as far as one can conclude from the partially defective case records, we find that we are dealing with a disease of the young, from 12 to 30 years of age in whom volvulus of the ileum appeared a shorter or longer time after appendectomy. The time intervening between the appendectomy and the appearance of the volvulus is from a few days to two years. The symptoms which the patients having volvulus present were the same that always appear in intestinal obstruction. The treatment in three cases consisted in the employment of enterostomies, in one case no operation was done, and only in my two cases was laparotomy with retorsion of the rotated loop practised. The cases all died, with the exception of my second case. My first case, too,

should have been saved, if the previously often-diagnosed hysteria had not led me to delay.

The age of patients corresponded to that in which appendicitis is most frequently found. If one should judge from these cases, the prognosis is very poor, five deaths in six cases. It is not indeed to be disputed that this bad prognosis is to be explained on the ground of ignorance of this condition and of improper treatment and that is can still be very much improved upon. These reflections also justify the publication of these case histories.

I have reviewed here only the cases in which purely a volvulus of the ileum developed subsequent to appendectomy, in which no bands, no adhesions or strangulation of the intestinal loops were found on autopsy. In addition to the above there are numerous cases cases in which, subsequent to appendicitis, intestinal loops are fixed by strangulation under a band or in a hernial opening or by adhesions, and the volvulus then takes place in this manner. The mesentery of the loop is twisted by means of a peristalsis increased from some cause and by virtue of just this peristalsis, constantly more of the efferent limb is shifted hither so that then a volvulus of a large part of the small intestine is established.

Explanation according to Wilms. I find a similar case reported by Sprengel.

W. Herman, 26 years old, servant, admitted August 29, 1901, dismissed on the 2d of February, 1902. On the 5th of April, 1898, on account of four attacks of appendicitis at short intervals, was operated in the interval. Two days ago there were sudden violent pains in the region of the navel. The last attack of vomiting was this morning, vomitus contained bile. No bowel movement for three days, no flatus for two days. Present condition: Pulse, 84, regular. Abdomen somewhat distended, liver placed on edge, its under border three finger-breadths above the costal arch. No dullness over the sloping portion of it. Clearly changing intestinal sounds in the region of the navel a tightly distended, large intestinal loop is palpable. Operation: incision in the median line after eventration, a loop of small intestine was found with its summit attached to the old operation scar, and around this as a point of fixation, the gut was twisted and its lumen obstructed. The loop was untwisted, the stagnant contents of the small intestine were emptied into the large intestine and out through the rectum. Recovery.

A further case is described by Kappis, he reports:

On the 23d of July, 1908, the appendix was removed on account of a severe suppurative appendicitis; because of a diffuse suppuration, tampon and drain could not be removed for a long time, and there consequently remained a drainage fistula, the closure of which required a rather long time. On the 5th of September, 1908, the patient was dismissed from the hospital entirely recovered without post-operative hernia.

On the 24th of September, 1908, the young man returned to the hospital on foot in spite of his wretched condition and made the following report: Until yesterday he was entirely well and free from pain. His bowels had always been normal. Without any known provocation, he was suddenly seized yesterday evening with violent pains in his lower abdomen, at first more severe upon the left side; in the course of the night the pains became continuously worse. Early to-day he had a single movement of his bowels, with passage of flatus. He had then in the course of the morning frequent vomiting and his general condition became rapidly worse. On this account the patient came directly to the surgical division of the hospital without previously visiting a physician.

Findings: Great unrest, anxious facial expression, countenance very pale, pinched and wasted, tongue dry, furrowed like a raspberry. Frequent eructation, often vomiting of dark green, foul-smelling masses with admixture of fecal matter.

Pulse could scarcely be felt or counted, greatly accelerated, the abdomen greatly distended and tight, a high tympanitic note over the whole abdomen, dulness nowhere. Liver dulness could scarcely be detected, diaphragm at a high level. Marked sensitiveness to pressure over the whole abdomen, most sensitive about two finger-breadths below the navel on the right and left of the median line, but more on the right. Ridges of the intestine could be seen from time to time advancing visibly with severe pains, judging from the expression of the patient. On the whole rather to the right of the median line, three oblique rows of intestinal loops appeared, lying parallel one above the other, with narrow spaces between. These distended with vigorous visible peristalsis, proceeding from left to right and audible without auscultation. After some time the peristaltic wave recedes, the intestinal rigidity is no longer visible, and the patient feels somewhat easy. After a short pause the process just described is repeated. The stiffness of the lowest intestinal loop is most marked and at this point the greatest tenderness is found.

The temperature at noon was 36.6 c (axilla).

Nothing abnormal was demonstrable in the scar from the previous operation.

The diagnosis of ileus (consequent upon intestinal adhesions following appendicitis) was doubtless correct; on account of the very lively peristalsis, peritonitis could safely be excluded. The loss of strength and the loss in the quality of the pulse rapidly increased, and the patient collapsed under an attempt to irrigate the stomach. On this account, immediate operation was done under ether narcosis, drop method, though the pulse could scarcely be felt.

In spite of the fact that the obstruction lay upon the right side, the incision was made in the median line, from the navel to the symphisis, because without doubt, adhesions to the scar and in the region of the old operation, were to be expected, which under the circumstances could render orientation very difficult.

After opening the abdominal cavity a small quantity of thin, slightly turbid, sanguinolent fluid escaped. Numerous loops of small intestine markedly distended, bluish red in color, but still glistening presented in the incision. These loops manifested active peristalsis and occupied almost the entire abdomen. The mesentery of this small intestine is rotated 180 degrees about its axis, of course, in the direction of the hands of the clock. The transition between the distended and collapsed gut is not easily discovered. First we found, after some trouble, a relatively short segment of small intestine, in the lower quadrant; it was stretched tight and could not be drawn forward. The volvulus at first could not be lifted up.

In the right of the abdomen, numerous partially flaky, partially cord-like adhesions are present which apparently produce the hindrance to reposition. These are ligated in stages with double ligatures and cut and now there appears a last, rather broad, tight cord which extends from the caecum to the large intestine and, to be sure, into the region where the distended and collapsed small intestine meet. After a double ligature and severance of this last cord, the volvulus of its own accord becomes released and the collapsed loop of small intestine lying distal to the point of the constriction are again filled with intestinal contents. The insertion of the cord of adhesion lay about 1 cm. above the ilio-caecal valve, the loops of small intestine proximal thereto took part in the volvulus, while the distal portion was cut off by the constriction and remained empty. A real constriction is not visible. How much of the small intestine was drawn into the volvulus could not be determined accurately. The distension of the small intestine embraced at any rate, all of the loop of small intestine lying above the obstruction.

The loops of small intestine drawn into the rather immovable adhesions showed thickened fibrinous deposits on the serosa as well as on the beginning portion of the caecum.

Pronounced cicatricial changes of the mesentery were not observed.

Immediately after relieving the volvulus, the pulse which had already become discernible after opening the abdomen, became perceptibly better.

Owing to the reduction in intestinal distension after escape of gas into the efferent portion, replacement of the small intestine into the abdominal cavity was accomplished without difficulty by a slight elevation of the pelvis.

After irrigating the abdominal cavity with hot 40-50 degrees C) physiological salt solution, a very thin drain was placed into the pelvis, the abdominal wound was closed in layers with continuous sutures, the bandage applied. Then the patient received immediately, an intra-venous infusion of 2,000 c. c. of normal salt solution, containing 8 drops of suprarenalin chloride (1 to 1,000), after which the pulse became rapidly better.

The after-treatment consisted in elevated position in bed, continuous drip enema, subcutaneous injection of physostigmine salicylate (1 gm), digalen subcutaneously, irrigation of the stomach on the following morning, after which eructation ceased, and after another injection of physostigmine the patient passed flatus in the afternoon. Shortly afterwards there was a bowel movement and the appetite and strength improved rapidly. The drain was removed on the third day after operation, on the 15th day he got up for the first time, and on the 16th day the continuous skin suture was removed. The large wound was healed smoothly except a small subcutaneous necrosis in the lower angle of the wound which closed rather quickly by second intention, under the use of cupping, etc. At the beginning of November, 1908, the healing was complete; however, we detained the young man in the hospital for a longer time in order to be able to observe his convalescence.

He was dismissed on the 5th of December, 1908, wearing a close-fitting abdominal binder. Scar was firm, rather broad below, no post-operative hernia present; general condition excellent, appetite good, daily bowel movement, no discomfort in his abdomen.

Since the beginning of January, 1909, he has resumed his work as butcher, and has had no further trouble.

Similar cases are described by Giertz, in which after appendicitis, an intestinal loop has become fixed by adhesion and a consequent volvulus established. Von Wilms' explanation of the establishment of the volvulus in these cases is entirely satisfactory.

It is surprising that these relations between appendicitis and volvulus have not been previously observed, perhaps for this reason: Because the two conditions are often rather widely separated from each other, and on the other hand, because many cases are simply mentioned under the title of intestinal occlusion, or ileus following appendicitis.

Subbotitch alone has called attention to the possibility of the establishment of flexure-volvulus, which is predisposed to by the shrinking of the mesentery of the flexure and the consequent approximation of its extremities. He believes, therefore, that chronic peritonitis and mesenteritis retrahens, consequent upon appendicitis are to be taken into consideration as an etiologic factor. His contribution appears to me of especial value, therefore, I quote it.

"The appearance of mechanical ileus (through the formation of bands and such like) as a late consequence of appendicitis is a manifestation relatively little appreciated.

"I had opportunity to operate on some cases belonging to this category. Among them was one, a farmer, twenty years old, who had been cured of appendicitis by a laparotomy and had an acute ileus in consequence of incarceration of a loop of small intestine under a cord-shaped pseudo-ligament which extended from the caecum in the neighborhood of the appendix on one side to the root of the mesentery of the small intestine on the other. The appendix removed by amputation, was in this case small, hard, had thickened, callous walls and scars in the

mucous membrane. Its mesentery was fibrous and contracted.

"Moreover," and this appears to me especially worthy of attention, "several contractions and fibrous bands were found on the peritoneum in the region of the caecum, of the true pelvis, and of the flexura Romana. At the base of the mesentery of the sigmoid-flexure, this condition was especially plain. The extremities of the flexure were more closely approximated than normal, so that I was compelled to cut several of these bands and by means of sutures to spread the meso-sigmoid in order to prevent a threatening volvulus."

It is clear that the appendicitis in this case is considered the real cause which had conditioned the ileus coming up after recovery from a primary disease. Furthermore, I believe that the chronic peritonitis and mesenteritis retrahens consequnt unon appendicitis are to be considered as etiologic factors, because of the significant shrinkage of the meso of the flexure and the consequent approximation of the extremities of the loop, all of which could contribute really to the formation of a volvulus of the flexure, perhaps of other sections of the gut.

According to Wilms, several predisposing factors conspire to produce volvulus of the small intestine, above all, such factors as produce conditions favorable to the volvulus, just as is the case in the sigmoid-flexure especially a considerable congenial narrowing of the mesenteric stalk of the small intestine. These cases are usually observed in the new-born, but they appear also in adults. Similarly favorable conditions for the development of a torsion, such as occurs in the flexure, are produced by those intestinal loops which are compressed against each other by shriveling of the mesentery.

In this instance, as Leichtestern says, an independent intestinal loop is established with a thin pedicle, just as happens in case of the flexure on its narrow pedicle.

Such independent loops are capable of appearing in small intestines, which have lain for a long time in the lesser peritoneal sack, just as a hernial opening; in a similar manner all openings within the abdominal cavity can give occasion to the establishment of a volvulus. The greater part of axis-rotation, according to Wilms, appears in all cases, where the mesentery is of normal form and width, and the process is as follows: A tension on the mesentery is produced during a normal and harmless axis rotation of a loop of small intestine through 180 degrees, under the influence of extraneous circumstances which concur with the filling and obstruction of the small intestine. Thereupon, the gut at the efferent loop is twisted upon the mesentery by peristalsis, and this continues so long and so abundantly that because of the twisting of the mesentery, even disturbances of the circulation take place.

After these details taken from Wilms' excellent work on ileus, we will investigate in what manner a past appendicitis can be the cause, or at least a predisposition for a volvulus of the small intestine. Above all, there are the residues of a past peritonitic process, in the form of adhesions, bands, formation of pockets, after inflammation of the caecum, through which and in which intestinal loops can become fixed and where axis-rotation of the small intestine takes place, according to the explanation of Wilms. I have given above a typical example of such cases.

Furthermore, a past appendicitis can serve as a predisposing cause of volvulus, because it gives occasion to the so-called mesenteric peritonitis. According to Danielsen, we understand by mesenteric peritonitis, a chronic inflammatory process of the peritoneum of the mesentery, which at times runs its course during foetal life. This inflammatory process heals with the formation of scar tissue and produces a contraction and reduction in size of the entire mesentery in its transverse axis by virtue of the shrinkage of this new-formed connective tissue. According to Reidel's investigation, the process localizes itself often most intensively and most early in that part of the mesentery farthest from the gut, therefore in the root of the mesentery. But if the root shrinks, then the ends of the loop belonging to the effected part are approximated and the tendency towards rotation on the axis is produced. (Heberling.)

Fillipowicz first called attention to the connection between mesenteric peritonitis and volvulus of the small intestine. Wilms adds that a primary mesenteritis with a shrinking of the mesentery may well be looked upon as a favorable factor for the production of volvulus of the small intestine. In individual cases, however, he believes that the scar tissue frequently

is not the predisposing cause, but the consequence of the rotation on the axis. "The volvulus may be latent for a considerable time, but it may produce only slight symptoms and during this time, partially because of the traction, partially because of the rotation itself, and the downward pressure of the efferent loops, injuries are produced which heal with formation of scar tissues. This scar tissue, therefore, would be a consequence, and not the cause of the already existing axis-rotation. "Wilms, however, admits, in writing on flexure-volvulus, that the pedicle of the flexure is in many cases narrowed by the pathological processes. Inasmuch as constructions appear in the meso-sigmoid, which approximate the loop, either only at its basis or sometimes throughout its extent. He thinks with Virchow, that it is these previously named chronic, cured, local, inflammatory processes which produce the effect. Now I think on the other hand, that all that is true for flexure-volvulus, must also hold valid for volvulus of the small intestine. That is, if one accepts that there exists a connection, as a matter of fact, between mesenteric peritonitis and flexure-volvulus, then it must also be admitted to exist between mesenteric peritonitis and volvulus of the small intestine. Indeed a dissertation by Merkert has recently appeared which deals with this theme. Merkert reports a case of his own, seven from Flippowicz, besides two from the literature, in which he was always able to trace the volvulus of the small intestine to shrinkage of the mesentery, caused by previous inflammation. In the etiology of peritonitis, in particular, therefore of mesenterial peritonitis, appendicitis to-day plays the most important role, and we must admit that in this way, that is, shrinkage of the mesentery consequent upon appendicitis, volvulus of the small intestine may be produced. Perhaps this contribution may be the occasion of our directing our attention to these conditions, and we will then find such cases as will establish this connection.

I come now to speak of the most important point of this work, namely, in what manner an appendectomy as such, can be the cause of volvulus of the small intestine. Above all, I believe that a connection between appendectomy and volvulus of the small intestine must be admitted, since in the relatively small number of the cases of volulus of the small intestine so far observed, I was able to find six such cases among a relatively small number of appendectomies. If we admit such a relation, then we must also find unobjectionable explanation for the same. If we consider now the anatomical relations, we find that the appendix forms a connection between the last loop of the ileum and the normally-placed caecum, by virtue of its mesenteriolum, and in this manner, so to speak, serves as a prop for this last loop of the ileum. I formed this opinion of the anatomical condition from cadavers, and from occasional surgical autopsies, and was delighted later, by reading on the subject, to find confirmation of my opinion. Sprengel describes in his book two heavy peritoneal folds in the neighborhood of the caecum and the appendix. The first of these, the plica ilio-meso-appendicularis, was described as having been mentioned first by Luschka. It extends from the posterior surface of the small intestine, corresponding to a continuation of its mesentery downward, and attaches itself partially to the inner border of the caecum, partially in a flattened arch, to the mesenteriolum, so that it covers over the angle between the ileum and the caecum, like a tent, and forms the recessus ileo-caecalis.

The second peritoneal fold is the placa ileocaecalis, and extends still further from the front surface of the ileum upon the front surface of the caecum (this was also described by Luschka). Luschka is inclined to attribute a definite role to the folds just described in changes of relation of the small intestine, especially to the first one. It is intended, as he expresses it, to secure the position of the small intestine and to maintain its relation. If this pillar is removed by a previous appendectomy, then the mesentery of the last loop of ileum is narrowed to that extent. It is the same as if the pedicle of the sigmoid-flexure

should become narrower by some process and then the last loop of ileum is easily twisted by peristalsis, increased from some cause, that is, so-called axis-rotation takes place as a consequence of which the two limbs of the last loop of ileum are crossed in such a manner that the efferent loop comes to lie above the afferent. Since Wilms has shown beautifully how a pathological axis-rotation grows out of one perhaps physiological, I need not here discuss that point further. I should like to add a single consideration, namely, that after an appendectomy, not only does an axis-rotation of the last loop take place more easily, but that the possibility for its spontaneous replacement is much reduced. In the normal relations in the abdominal cavity, axis-rotation will certainly often take place as a result of the peristaltic motion of the gut. These rotations, however, are spontaneously reduced because the mesentery and the intestines, as a consequence of their elasticity, have a tendency to return to their normal relations. This tendency is all the more restricted, the less fixed the gut is, the smaller the base of attachment of its mesentery, and the more pedunculated the mesentery is; by appendectomy and ligation of the mesenteriolum, the base of attachment of the mesentery of the last loop of ileum becomes much smaller and thereby these conditions are brought about.

For a better understanding of the subject, I have artificially produced this relation, in a way representing the mesentery by an elastic material (para rubber). The experiment showed that when I folded the material in imitation of intestinal volvulus, it returned to its former relation the earlier, the greater its line of fixation was, and it remained in its one position the easier, the shorter its line of attachment was. Therefore, the reduction in the base of the attachment of the mesentery works in a double manner to establish a volvulus, first by rendering rotation much easier, and second by rendering restoration to its normal position much more difficult.

The following circumstance also favors our assumption relative to the causation of volvulus of the small intestine after appendectomy, namely, that in the prese nted cases the lower loop of the ileum was always affected, inasmuch as its mesentery was alone involved by the appendectomy, and the volvulus never began in a higher loop, as is otherwise often the case.

A definite type seems to confront us, inasmuch as the loop was always turned in the direction of the hands of the clock.

I shall dismiss the treatment in a few words. To a surgeon there can indeed be no doubt that only a laparotomy with reposition of the gut and eventual, rational fixation of the intestinal loop can be indicated. For our special cases one point, however, must be discussed, namely, the question of employment of enterostomy as it is recommended by Heidenhein, particularly in paralytic ileus.

One cannot wonder that in our cases, in which sooner or later, after an appendicitis symptoms of ileus appeared and in which the exact diagnosis of the type of ileus could not be determined, often only a paralytic or inflammatory ileus was thought of, and an enterostomy was done. Naturally with bad results. Gierke, in whose cases this operation was most frequently employed, expresses himself as follows:

"According to my judgment, enterostomy es ground more and more in the treatment of ileus, and very justly so, for in a mechanical ileus enterostomy does not get rid of the cause, which continuing its effects is capable of producing gangrene and perforation in the intestine and of begetting a fatal peritonitis; neither in paralytic ileus, because the intestine, being crippled, does not functionate and so the enterostomy at most is able to empty only the loop of gut attacked by the operation, but does nothing for the intestine lying higher up."

Thus Gierke makes this operation directly responsible for the bad results in his cases. Noetzl also discards it.

If one would not be contented to do an enterostomy in every undoubted case of ileus which comes up in the course of appendicitis, or after an appendectomy, but would strive to locate

the cause of the same by a laparotomy, then one would, in my opinion, often disclose this volvulus and would be able to establish much more favorable prognoses.

APPENDICOSTOMY.

J. Pettijohn, San Francisco (*Journal A. M. A.*, March 12), reports a method of appendicostomy done by him in cases of amebic dysentery which he thinks an improveemnt on the ordinary methods. The operation is described as follows: "An incision 3 inches in length is made, directed downward, parallel with the fibers of the rectus muscle and about three-fourths of an inch internal to its outer border, beginning at a point half an inch below the level of the umbilicus. The superficial structures over the rectus muscle are divided in the same line, thoroughly exposing the rectus and retracting it toward the median line, after which incision is made into the abdomen through the tissues posterior. The fingers are introduced to determine the point of origin of the appendix. Over this point a vertical stab wound is made through the abdominal wall, using a small straight bistoury one-fourth of an inch wide. While making this incision the intestines must be protected by a thick pad of gauze held on the inner surface of the abdominal wall at the proper place. In cases in which the mesoappendix is too short or too narrow to permit the appendix to be drawn out of the abdomen, it should be clipped on the free edge at a point well toward its termination in order not to interfere with the blood supply of that portion of it which is to form the canal. A pair of narrow forceps is thrust through the stab incision, grasping the appendix and drawing it out until the intestine is in contact with the abdominal wall, after which it is held in place with several interrupted sutures at the opening in the skin. The large wound is closed with three layers of sutures and sealed with collodion or tincture of benzoin. The appendix is then removed at a point one-fourth of an inch beyond the skin, and a catheter inserted into the canal at once in order to keep it patent. Considerable swelling in its walls always occurs, and it is much easier to open the appendix and introduce the catheter immediately than to wait." The advantages claimed are the greater cleanliness, from not sewing the appendix in the large wound, which can be completely sutured and sealed aseptically; the immediate applicability for quinin injection; the lessened danger of secondary hernia; and the advantage of exactly locating the appendix before making the stab wound for its extraction. The secondary operation for care of the sinus after recovery is much simpler than with former methods. The solution generally used is quinin sulphate in warm sterile water, the treatment beginning with half a liter of a weak solution, the quantity and strength both being increased in the subsequent daily injections. After the operation of appendicostomy the entire bowel can be irrigated continuously with the solution for long periods of time and the results of treatment are not altered when the ordinary solution in large amount is not retained. The ordinary solution is distinctly an irritant in the bowel, and in the after treatment of the cases treated it was found that the use of a physiologic salt solution at a temperature of 39 C. as a menstruum for the administration of the quinin was followed by a complete alleviation of the irritation. The author believes that the operation of oppendicostomy should be reserved for those cases of amebic infection in which prolonged treatment by enemas by rectum has been ineffectual. Most cases of chronic dysentery and other forms of amebic infection in the Philippines are perfectly amenable to treatment with high enemas with quinin solution, but in a certain percentage such fails, possibly on account of not being sufficiently high in the bowel to reach the seat of the disease.

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HYPERTHYROIDISM.

The term hyperthyroidism has been proposed by Mayo and others to include that group of symptoms, including tachycardia, goitre, tremor, with or without exopthalmos and the other eye changes, together with the minor symptoms, such as nervous excitability, excessive sweating, etc. As it has been established that each and all of these effects are produced by increased production of thyroid secretion, it would seem that hyperthyroidism is more comprehensive and expressive than Graves' disease or Basedow's disease. Inasmuch as it is the chief and constant manifestation of exopthalmic goitre, and in view of the fact that it may exist without the exopthalmos, it would be a distinct gain in nosology if this term could be universally adopted.

There are many cases presenting lesser degrees of hyperthyroidism. It is rather frequent in young women. Its first manifestation may be misinterpreted as a nervous phenomenon; the goitre may be absent or overlooked; the rapid pulse incorrectly ascribed to other causes; and the entire symptom complex misunderstood until a grave degree of hyperthroidism is allowed to develop, and perhaps exopthalmos tardily tells the tale.

The goitre of adolescence in girls sometimes persists and becomes an adenoma which may, from some infection, be suddenly stimulated into pathological activity and present the characteristics of hyperthyroidism. Moreover, a so-called simple goitre of long standing may at any time assume the histologic structure, and thus the hypersecretion and change to the exopthalmic type. Inasmuch as the real histological difference between ordinary goitre and exopthalmic goitre consists largely in a tremendous multiplication of the cellular linings of the acini of the gland, who is to say when an ordinary adenoma may suddenly take on these changes that are manifested by an overproduction of thyroid juice?

The clinical picture is so strikingly toxic and all of the changes throughout the body the result of chronic irritation from an abnormal amount of thyroid fluid in the blood, it is evident that the only rational means to control this is to stop the overproduction of thyroid juice and not simply attempt to palliate its results. In the early cases that can be diagnosed, ligation of the superior thyroid arteries, thus cutting off a large portion of the blood supply to the gland, will stop the production of thyroid juice and thus relieve the condition. Histologically, the gland undergoes reversion to the simple type. This procedure is also of very great value in those cases of exopthalmic goitre in which the condition has existed so long that the patient is unable to stand the removal of a portion of the gland. In long standing cases the system is so thoroughly saturated with thyroid fluid in excess that the runaway heart with its muscle atrophy and dilatation is scarcely in a condition to stand an operation, with or without an anesthetic. The psychic factor, including the fright of the operation, so stimulates the secretion of the gland that sometimes a fatal overdose is poured into the circulation. One of these cases have been known to die from this cause before an operation was commenced.

The efforts of the profession should be to prevent these serious delays and lethal conditions by timely resort either to ligation in the early cases or extirpation of the larger lobe in those who are able to withstand the operation.

The uncertainty of all forms of medical treatment has stimulated the surgeons to a perfection of technique that has given a remarkably high percentage of permanent cures. Heinecke collected 332 operations with 86 per cent cured. Kocher has performed 376 operations with 76 per cent of permanent cures. The mortality in these series was 5.6 per cent and 3.9 per cent respectively. While, to be sure, some cases have periods of improvement and occasionally undergo spontaneous cures without treatment and oftentimes in spite of it, still it has been the misfortune of every practitioner to observe cases that went on to a fatal termination that theoretically could have been cured by timely resort to surgery.

Fairly satisfactory results have been obtained from the administration of the hydrobromate of quinine.

The serum of Beebe and Rogers has undoubtedly affected some cures, but statistics pointedly prove the superiority, so far as the results are concerned, of surgical intervention.

To be sure it has been only in the last half of the present decade that operative results have uniformly yielded such pleasing and satisfactory results. This has been due, largely, to the genius of Mayo and the brilliance of Crile and the work of Ochsner in this country. Many other surgeons have followed in their wake, and while it is the most exacting and oftentimes the most desperate surgery, yet it is capable of yielding most gratifying results. It is well known that the celebrated Kocher has long ago perfected the operation for simple goitre, and has reduced the mortality to an inconsequential quantity. His skill and teaching in the management of these cases has permeated the world, and the profession can now confidently look forward to a new era in the handling of this interesting and dangerous disease. W. D. H.

BOOK REVIEWS

Pulmonary Tuberculosis and Its Complications. By Sherman G. Bonney, A.M., M.D. Published by W. B. Saunders & Co., Philadelphia and London.

This second edition has been thoroughly revised, contains 918 pages of reading matter, with 243 original illustrations, including 31 in colors and 73 X-ray photographs. There are five new chapters in this volume, and many others that have been rewritten and materially changed.

Practically all authorities on this subject are herein quoted in many places, and many of their statistics shown in their appropriate places; while it does contain a number of statistics they do not grow tiresome and are very instructive when closely inspected. Under the etiology we find first a historic review to be followed by a description of the micro-organism and a differentiation of this from various other micro-organisms resembling it. One chapter is devoted to the all important subject of the relation of human and bovine types of micro-organisms, which is followed by several chapters on different means of infection.

After dealing with the pathologic anatomy, symptomatology, course, varieties and terminations in an excellent manner he takes up physical signs which I consider the best series of chapters in the book. First the physical signs are dealt with in general and then taken up in order; chapters of from ten to twenty

pages being given to each, inspection, palpation, percussion and auscultation.

Under diagnosis we find a valuable chapter on "Special Aids to Diagnosis," in which all the various tuberculin tests are given with their disadvantages as well as advantages. Quite a number of skiagraphic plates are given to show the utility of the X-ray in diagnostis work. Then we find a differentiation of the types of tuberculosis to be followed by a consideration of tuberculosis of different parts of the body as pleura, pericardium, peritoneum, glandular system, bones, joints, alimentary tract, etc.

Under treatment we find tuberculosis dealt with in every manner that can be of advantage to these patients as well as the public.

Some of the most important chapters under treatment which should have special mention are as follows: "Reciprocal Relations of Consumptives and Society," "The Dissemination to the General Public, Through the Medium of Various Channels of Authentic Official Information Regarding the Prevention of Consumption," and "What the Public Should Know."

Although Dr. Bonney is very conservative in regard to tuberculin treatment, I find he gives some very good statistics in the cases that received this aid to the general treatment.

This book has an excellent index, and is one that should be found in the library of every man that is interested in tuberculosis in any form. O. N. B.

Dyspepsia, Its Varieties and Treatment. By W. Soltau Fenwick, M.D. (London). Pp. 485. W. B. Saunders Co. 1910.

The title of this book, "Dyspepsia," is used by the author to include all the various forms of indigestion, both gastric and intestinal. The classification of the numerous types of indigestion as given us by Dr. Fenwick appears to be based upon a thorough and scientific, yet practical, view of the pathology and etiology observed in an unusual clinical experience—over eighteen thousand cases. Statistics are given in one thousand cases, taken in order, five hundred being hospital patients and the rest taken from private cases. Diagnosis is discussed with much attention to details, at all times, however, holding the interest of the reader. The suggestions on treatment are logical and practical, being particularly helpful in many of those perplexing types so often encountered. The whole work is along broad lines and is sure to bring deserved credit to its author.

R. W. B.

ABSTRACTS OF CURRENT LITERATURE

Infectious Diseases.

According to J. Ruhrah, M.D., in March number of Progressive Medicine, 1910, the review of the literature pertaining to infectious diseases for the past year shows a continued interest in investigations along certain lines. It is curious that the more common infectious diseases, scarlet fever and measles, have received comparatively little attention, while a great deal has been devoted to the other classes of infectious diseases, particularly those occurring in the tropics. This increase in interest in tropical diseases is a natural outcome of the brilliant results obtained in certain hot countries, where, owing to advanced sanitary measures, places heretofore almost uninhabitable have become as safe as, and one might even say safer than, most northern cities.

There have been a number of articles during the year concerning the relation of protozoa to infectious diseases, and more attention is being paid to insects as carriers of disease, the common house fly coming in for general condemnation as being a carrier of typhoid, dysentery, and of infantile diarrhea, as well as other diseases at times, to say nothing of the

contamination of milk and food by bacteria-producing decomposition.

Human carriers of disease have also been more thoroughly studied than ever before, and next to the patient may be regarded as the most frequent source of infection in certain diseases, particularly typhoid and dyptheria.

The Bordet-Genguo reaction, which marked an epoch in the study of infectious diseases, has been made the subject of investigation by many observers, and further research has been undertaken in the practical diagnosis of syphilis in the so-called Wassermann-Neisser-Bruck reaction. It has also been used in typhoid, echinococcus disease, and smallpox.

Bordet and Genguo a few years ago, also discovered a small bacillus which they believed to be the cause of whooping cough, and this has been a matter of interest, although comparatively few reports concerning it have been published during the year.

The Flexner-Jobling serum in the treatment of cerebrospinal fever continues to meet with commendation on all sides, and a new method of diagnosis by precipitins has been suggested by Vincent and Bellot. This, if found to be reliable, would simplify the exact diagnosis of cerebrospinal fever very much, and similar methods may be applicable to other diseases.

One of the most important contributions of the year is the announcement by Flexner and Lewis that they have been able to transmit anterior poliomyelitis to monkeys, and from these monkeys to others through a series of a sufficient number to demonstrate that they were carrying the virus of the disease which had developed in the animal itself. This should stimulate researches into the nature of this disease, which has not been studied as extensively as its importance would seem to warrant.

In typhoid fever the ophthalmic test has been used in diagnosis following the same general principles as that employed in tuberculosis, and the few observers who had experience with it claim it to be reliable, and under proper restriction a safe method for general use. This will, of course, need further study, but anything which promises an early, exact diagnosis in typhoid is of great value.

Unusual interest has been taken in the hookworm, and the large donation made by Rockefeller for the study of the disease and the relief of the conditions in the South ought to yield a rich reward in the near future.

After the fourth disease we have the fifth disease described by Watson, and we may confidently look for a description of the sixth disease unless some one discovers some more exact method for the differential diagnosis of the acute exanthemata, a wish that may not be as utopian as it appears in the light of what has been accomplished by Bordet, Genguo, and others.

Hiss has published an account of his method of treatment of disease with an extract of leukocytes, which promises to be of service in certain conditions.

The Principles Underlying the Wassermán Tests for Lues.

The rapidly changing terminology and much useless theorizing has given rise to a literature difficult of comprehension unless much time and attention is paid to it, says Ruhrar, in March number of Progressive Medicine, 1910. This brief explanation will doubtless be welcomed by many who have not time to unravel the tangle for themselves. A practical working knowledge of the reactions can only be acquired by much actual experience.

Several definitions must first be given. An antigen is any substance which, when introduced into the body of an animal, gives rise to the formation of antibodies. These antibodies are called amboceptors (immune bodies), and they are not necessarily antitoxic or protective.

To complete the reaction a third thing is necessary—the complement which is present in all normal flesh sera and which is destroyed by heating 56°C for an hour.

The reaction may take place with bacteria of blood. Hemolysis is that change which

takes place when the blood serum of one animal is added to the blood serum of another. Thus, if rabbit serum be added to sheep's serum blood, a solution of some of the sheep's corpuscles takes place. If the rabbit be treated by injecting sheep's corpuscles, and the serum withdrawn, it will be found to have the power of dissolving corpuscles greatly increased. The substance formed in the blood that increases the dissolving power is the antibody, or immune body, or the amboceptor of the reaction. A similar bacteriolytic reaction may take place. For example, an emulsion of typhoid bacilli, the serum of a patient with typhoid fever and a normal fresh serum, say, from a guinea pig, represent respectively antigen, an amboceptor, and complement. If these are incubated half an hour at body temperature the bacteria will dissolve.

In 1901 Bordet and Genguo discovered that if to such a reaction two elements of a hemolytic reaction be added, say, sheep's corpuscles and amboceptor, then, if the reaction is complete, there will be no complement left to complete a hemolytic reaction, and this method is utilized to show whether a bacteriolytic reaction has taken place or not, as without it there is no visible change in the appearance of the bacterial tubes.

The blood of the patient to be tested is heated to 56°C. for half an hour, to destroy any complement in it, as the amount present is an unknown quantity. The complement used, that of guinea pig serum, can be easily measured.

The Wassermann-Neisser-Bruck reaction for syphilis is an application of this test, using instead of a culture of spirochetae, which could not be obtained, an extract of a liver of a fetus in which the spirochetae have been demonstrated. The reaction is performed by mixing the extract of the fetal liver (antigen), the blood of the patient to be tested (amboceptor), the blood serum from a guinea-pig (complement), serum from a rabbit previously treated with sheep's corpuscles (hemolytic amboceptor), and sheep's corpuscles (hemolytic antigen). If there is hemolysis of the sheep's corpuscles the reaction is negative, as it shows that the complement was not used to complete the bacterial reaction. If hemolysis does not take place, the test is positive, as it shows that the reaction has been completed and there is no complement left.

Several modifications of this test have been proposed. Bauer utilizes the hemolytic amboceptor present in the patient's blood (it must be supplied if infants are tested). This test is said to work out practically in spite of some theoretical objections.

Noguchi has modified the original reaction by impregnating small squares of paper with the antigen, complement, and amboceptor, and drying them, and he uses a solution of a drop of human blood (not the patient's) in 4 c. c. of normal salt solution. Noguchi has even suggested the use of the vest pocket in place of the incubator, and has so devised a test which may be easily used and which is said to give satisfactory results. As a matter of fact, it requires considerable experience with the reaction to obtain good results.

Fox, in the Medical Record, March 13, 1909, p. 421, has given a short but comprehensive account of the Wassermann test and its practical application, as well as of the more recent modifications. Wm. L.

Report on the Employment of Vaccine Therapy in Gynecology and Obstetrics by Drs. Williams, Cragin and Newell in July Number of Surg. Gyn. and Obstetrics.

After a brief review of immunity with reference to the various theories, including that of phogocytosis and opsonins, the subject proper was discussed under four different headings after a thorough review of the literature, the authors having had little personal experience in this special work.

1. Its use in gonorrheal infections, including vulvo-vaginitis of girls.

Seems to have been of most value in the treatment of gonorrheal arthritis and in chronic cases of vulvo-vaginitis in young girls.

Very few report any good results in acute urethritis.

It has seemed to do some good in a few cases of septicemia due to the gonococcus, though cultures could be obtained from the blood after disappearance of all symptoms. There seems to be no decided advantage of the autogenous vaccine over that gotten out of stock.

2. Infections of the Urinary Tract—Most cases of infection in kidney ureter and bladder were due to the colon bacillus. In such cases the stock vaccines appeared valueless, but the autogenous vaccines in many cases seemed to hasten abatement of all symptoms, though the organisms did not disappear from the urine. Seemed to have had better effect in treatment of pyelitis than of cystitis; also of some apparent value in cases of pyelonephritis of pregnancy. Of no value in streptococcic infection.

3. Inflammatory conditions of the internal genitalia. Of no particular benefit as far as could be ascertained.

4. Puerperal infection. Of practically no value in acute general infections, though a few have claimed good results. Best in chronic local conditions, when it seems to hasten recovery.

CONCLUSIONS.

1. There is no doubt that opsonins take an active part in the production of immunity, but the determination of the index is difficult and uncertain.

2. It is valuable as a prophylactic measure in a number of diseases; of undoubted value in chronic local conditions; of very doubtful value in acute general infections.

3. Of some value in gonorrheal arthritis, chronic urethritis and chronic vulvo-vaginitis.

4. May hasten symptomatic cure in infections of bladder and kidney.

5. May be of some value in assisting to bring about a cure in chronic infections of the uterus and in old abdominal sinuses.

6. Of little or no value in acute general puerperal infection, though it may hasten relief of trouble in chronic local conditions which, however, tend to get well under the ordinary methods. J. O.

VACCINE THERAPY as an Adjunct to Surgery. By Drs. Deaver, DaCosta and Pfeiffer in August Number of Surg. Gyn. and Obstetrics.

In this article is given a very interesting review of a number of well-advanced cases of sepsis treated with vaccine. As has been observed before by many others, a large number of cases of furunculosis, carbuncles and other pustular affections of the skin have been treated with great success. It is also mentioned that this treatment in suppurating sinuses from middle ear have been almost equally successful.

Of more special interest to general surgeons is the history of 17 eases which were profoundly septic. These cases were divided into two groups. In the first there were nine, in all of which the organisms were recovered from the blood. The first three cases were aall due to the strepcoccus; were in extreme condition when treatment was begun, and all died.

Of the next five, four were due to the staphylococcus aureus and one to the albus. All were very severe in nature and all recovered. The ninth case was due, as far as could be ascertained, to the bacillus endocarditidis aand ended fatally.

The second group of eight cases were all well advanced in a septic state, but either the organism was not found in the blood or was not looked for. The first five were due to the streptococcus; three recovered and two died. The next two were due to the staphylococcus albus, and both recovered. Case 17 was due to the aureus and died.

The infections occurred in various portions of the body—extremities, peritoneum, skull and kidneys.

A number of indolent abscess cavities and persistent sinuses were treated with good results, attributable in most cases to the vac-

cines. In all but one case autogenous vaccines were used, and this is strongly advised as being more certain and effective.

No bad effects were observed in any of the cases. The only contraindication recognized is in a case overwhelmingly intoxicated, where an additional amount of toxin might hasten death. The size of the dose ranged from 25,000,000, to 750,000,000, the average being about 100,000,000. It is better to use a small dose than one too large, as evidenced by the abuse of tuberculin. The interval ranged between every day and once every 10 days, the average being every 5 or 6 days. The dose and intervals were gauged by the condition of the patient, and the reaction. Opsonic index was not employed, but observation depended on instead. When the vitality was very low, small doses and long intervals were practised; when resistance seemed good, larger doses and shorter intervals were used. It is advised that we be careful in the use of vaccines, so as not to throw discredit on the measure through a fault in its application. They also strongly advise the use of autogenous vaccines and add that a hospital is not complete without suitable arrangements to give this additional support to surgery in its attempt to overcome infection. J. O.

A Study of Joint Tuberculosis.
By Leonard W. Ely, N. Y. (Surg. Gyn. and Obstet., June, 1910.)

He presents an original theory as to the localization and treatment of joint tuberculosis based on the findings in 62 specimens and on other clinical evidence. Reference is made to the current American and foreign views as to the location of the original focus. As proof that a bony focus is not always present, he thinks that the occurrence of primary synovial disease in tendon sheaths, and the failure to find a bony focus by careful examination in a number of joints in which the synovia is extensively diseased, may be accepted as conclusive. He also describes the progress of cases with the original focus in the marrow of the epiphysis of long bones, where, occasionally, rupture takes place through the bone without infecting the joint, but more often it extends through or around the cartilege infecting the joint tissues. Clinical results show that in children the tubercular process may be halted at almost any stage and the joint recover with a fair range of motion; this is not true with adults. In the cases with synovial origin the primary tubercle is deposited in the membrane itself, not, as König says, secondarily from the exudate. The exudate is regarded merely as a symptom.

A study of the specimens showed that no serious damage is ever done to the joint cartilege except that which is done indirectly by the involvement of the bone marrow beneath it. It is pointed out that in ordinary bone tuberculosis the only tissue directly affected by the disease is the marrow, and that it spreads, not in the yellow marrow of the shafts of long bones, but in the red marrow of their cancellated ends (as also in the red marrow of the vertebrae and other short bones). Hence it is reasoned that an operation that causes the epiphyses of the long bones to lose their cancellous structure, and to become compact bone will cause the disappearance of the disease at that spot. The vulnerability of the epiphyses of long bones has long been observed. The author contends that it is not necessary to remove all the diseased tissues in operating upon these joints, but only enough to get bony fixation and complete immobilization, thereby rendering the operation much quicker, safer, and less mutilating. He sums up thus: (1) Only two tissues, synovia and red marrow are subject to tuberculosis. (2) Their presence is dependent on function. (3) When the joint has been deprived of function they disappear. (4) When they disappear the disease dies out.

Therefore, to cure a tuberculous joint deprive it of function. R. W. B.

THE TUBERCULIN BLISTER REACTION.

Herbert De Carle Woodcock, Leeds, England. (Surg. Gyn. and Obstet., June, 1910.)

He has used the tuberculin blister reaction more than 500 times, and thinks it has distinct advantages over the Calmette and Von Pirquet diagnostic tests, being safer than the former and more reliable than the latter.

Technic: The skin on either side of the sternum is cleansed with ether and two similar blisters, one-third by one-half inch, are produced. The blister plasters are left on for eight hours, then the raised epidermis is clipped off. The raw surface is treated with water dressing for a few hours or at once washed with ether and dried with a sterile swab. To one of these denuded surfaces apply a piece of sterile oiled silk, on the under surface of which is one drop of Koch's O. T. undiluted. The upper surface of the oiled silk is then gently rubbed for half a minute and left on until the following day. The control area is treated in exactly the same way, except that no tuberculin is used.

In from 12 to 36 hours the surface treated with tuberculin is rosy red, and possibly covered with a thin layer of pus; the margin is surrounded by an erythematous halo. If tuberculosis is present the above reaction is emphatically positive, that is, the reaction is never doubtful. Pustules are seldom present, and never the scrofulous changes in the skin lesions that sometimes follow the Von Pirquet test. The author states that the reaction may be expected if the patient is tuberculous and not *in extremis*.

The advantages are: Rapid absorption; the reaction is vivid; the raised epidermis removes surface bacteria; the absorptive area is reached without penetrating the deep skin layer. Cases of lupus blistered and treated in this way show decided improvement.

Further experience and reports are desired before comparing it with the subcutaneous test. R. W. B.

HOOKWORM DISEASE.

C. A. Wells, Athens, Ga. (*Journal A. M. A.*, June 4), has investigated the prevalence of hookworm disease in the different sections of Georgia and tabulates the results. He examined white school children and found a large proportion of the older children and young adults in these schools infected, but the infection was far more prevalent in the southern division of the state than in the northern. His summary is as follows: "1. Uncinariasis is confined mainly to persons between 5 and 27 years of age. 2. The greatest infection occurs between the age of 6 and 16, inclusive. 3. Symptomatic diagnosis is unsatisfactory; thymol is an effective vermifuge in the treatment of hookworm; in some cases full recovery from the effects of the disease seems to be unattainable. 4. Males and females are infected approximately to the same extent. 5. Exclusive of the large towns, about 24 per cent of the total white population in Georgia have uncinariasis. 6. Ground-itch is the chief but not the only mode of infection. 7. The uncinaria may live in the intestines from two to twelve years."

FURUNCULOSIS IN AN INFANT.

M. Leale, New York (*Journal A. M. A.*, June 4), gives the history of a case which seems to him a novel one. The child was a prematurely born baby who suffered from a marasmatic condition for the first few months of life, but was apparently nearly normal at one year of age in physical and mental development, but who suffered from repeated attacks of furunculosis with accompanying fever and prostration out of proportion to the clinical findings and who also presents the unusual blood picture of an extreme lymphocytosis without other marked blood changes. He cannot account for this excess of lymphocytes. Lymphatic leucemia is excluded by lack of other symptoms, such as enlargement of the lymphatics and spleen, etc., and there was no evidence whatever of any malarial organisms

in the blood examination. There was nothing in the history or clinical findings to suggest specific disease and no enlargement of the thymus could be detected. The fever is probably accounted for by the staphylococcus toxemia, but this does not account for the blood picture. Two months' treatment with autogenous vaccine has left the patient in apparent perfect health and the cycle of the attacks has been broken. How long this immunity will last time alone can determine.

Pellagra.

D. King, New Orleans (*Journal A. M. A.*, March 12), reviews the theories and literature of the etiology of pellagra, which he says is still a mystery. As regards the theories, we are concerned chiefly with the zeist and the antideist, and he thinks the former is too firmly rooted to be altogether rejected, conclusive evidence of its erroneousness not having been produced. The idea that sound maize contains a toxic principle is now, however, generally discredited. The general trend of the European students seems to be in favor of the *Penicillium glaucum* being the causative agent. This seems to King to be extraordinary, for the simple reason that it is the most common of molds, found everywhere, and in all sorts of media. The clinical similarity of pellagra to ergotism has been suggested by Searcy and Minor and is here remarked on. Lombroso's "verdet" theory, which is current and popular at the present time, also recognizes this analogy of the toxins of damaged maize and those of rye in the production of these two diseases. The arguments of the antizeists are largely based on the uncertain correlation between maize consumption and the occurrence of pellagra, but King considers such evidence, especially that pellagra occurs where maize is never eaten, as doubtful. The protozoan theory of the disease has some support, such high authorities as Manson and Sambon being its strong supporters. King asks: Is it not possible that maize may bear the same relation to pellagra as the stegomyia does to yellow fever? It must not be forgotten that an uninfected stegomyia never carries disease, and this may also be the case with maize. Taken as a whole, the review leaves the question in an unsatisfactory state, and the author concludes by saying that in no instance brought to his attention have Koch's postulates been fulfilled.

The Urine in Diabetes.

W. Lintz, Brooklyn (*Journal A. M. A.*, March 12), says that the urinary findings in diabetes not only give the diagnosis of the disease but throw light on the etiology and aid the surgeon and physician when their work is complicated with diabetes. Certain mistakes, however, must be avoided. The sugar test may fail unless a twenty-four hour sample is taken, and it may disappear and be replaced by uric acid and phosphates. The turbidity of diabetic urine is noticeable and it is of practical importance as it is due to the growth of yeast cells which may cause, by fermentation, complete disappearance of glucose if the qualitative and quantitative examination is not made sufficiently early. Many other substances than glucose will reduce the various copper solutions, among which may be mentioned as most frequent, conjugated glycuronic acid, alkapton, creatinin, uric acid in excess, blood and lactose. A point that he had not seen mentioned elsewhere is that occasionally the urine of menstruating women will reduce the copper solution, on account, as he is fully convinced, of the presence of blood in the urine. This is an important point. Blocking of the secretion of the mammary glands may also produce lactose in the urine and the fermentation test will reveal the difference. It is surprising, Lintz says, how easy it is to eliminate the above-mentioned reducing substances by the simple Fenling test provided it is properly done, i. e., after boiling the solution and adding the urine drop by drop. Reboiling is not necessary, warming will do. If the reduction is rapid we may be pretty certain of the pres-

ence of glucose, but if it is slow and the precipitate yellow, instead of red, the fermentation test will verify. While the specific gravity of diabetic urine is usually high, it may be low if the absorption of nitrogenous material from the digestive tract is low. The quantity also is not invariably high. The total nitrogen of the urine should be increased on account of the greater ingestion of protein, but it becomes pathologic when the body albumin is also excreted with the high sugar output. The greater the nitrogen loss the more the patient suffers. A high ammonia value means a severe case and the ammonia determination gives an accurate estimation of the acidosis present. We can predict the onset of coma by the urinary findings. The finding of beta-oxybutryric acid or diacetic acid in the urine should always serve as a danger signal. The increase in the ammonia output is equally important. A sudden diminution or disappearance of glucose, together with turbidity from hyaline granular casts and the appearance of albumin in urine previously free from it, are also danger signals. Lastly, he mentions the Cammidge reaction as a valuable indiction of pancreatic disease which may be present in diabetes though he has had no experience with it in this disorder.

HEXAMETHYLENAMIN IN OTITIS.

Wilfred M. Barton, Washington, D. C. (*Journal A. M. A.*, March 12), reports a case in which he administered as an experiment 15 grains of urotropin in divided doses internally, to see what effect it would have on the discharge of an acute otitis media. The results as regards the therapeutic effects were good, the discharge being immediately lessened and ceasing after a repetition of the treatment. The point he specially makes, however, is that a decided reaction of hexamethylenamin was obtained from the ear discharge, showing its elimination by the aural mucosa. Whether all cases of purulent middle ear disease will be equally benefited is of course unsettled.

PUBLISHERS' DEPARTMENT

NEW EDITION OF GRAY'S ANATOMY.

A man may be a great anatomist or a great teacher, but when one man combines these two faculties his single mind, by its complete co-operation, can produce a teaching book in which matter and method blend into a result obtainable in no other way. This double-sided genius was possessed by Henry Gray, and until Nature grants to one individual like endowments, his work will stand. Owing to the incessant activity in all branches of medicine, books in any of its departments are almost invariably short-lived. The single exception to this rule is GRAY'S ANATOMY. In the fifty years since the author's early death it has grown beyond even the leadership in its own subject, and has become the foremost medical book in all English literature. As English is now the world-language, this is equivalent to primacy in the medical literature of the world.

Eighteen editions have been demanded in the course of its half century, and they have enlisted many of the ablest anatomists of this period. The principles on which GRAY built his book have been followed, and it is not too much to say that during two generations it has guided the teaching of its subject in America, as well as England. An army of students has conned its pages, and has carried it away into practice, for it is equally valuable to the physician and surgeon for reference on underlying points. In fact, the editor has made the applications of anatomy, in medicine as well as surgery, a special feature.

Of all the editions, this new one represents the most thorough revision. Every

line has been scanned for possible improvement. Anything in the nature of a possible obscurity has been clarified, passages have been rewritten, and new developments have been incorporated. Rearrangement has eliminated many duplications, and this, together with condensation in style, has rendered it possible to present more information in one hundred pages less space, to the reader's obvious advantage. Professor Spitzka, the editor, is one of the foremost anatomists in the world, and he joins to this the apt qualification of being himself an artist as well, so that the drawings from his own hand present his knowledge directly to the mind of the reader. Another of GRAY'S fundamental improvements, in which his book has always been unique, was the engraving of the names of the parts directly on them, so that the student learned at once not only their nomenclature, but also their position, extent and relations, the four cardinal points. The advantage of this graphic method over the elsewhere customary lines and reference letters is obvious. GRAY'S book was also the first to contain illustrations in colors. In this new edition, besides all the improvements in the text, the splendid series of characteristic illustrations has been equally revised, many cuts being replaced and more added, and the use of colors is more lavish than ever. No student in any profession, or in any branch of medicine, has offered to him any instrument of instruction comparable to GRAY'S ANATOMY. It suffices to say that the new edition will excel any of its predecessors.

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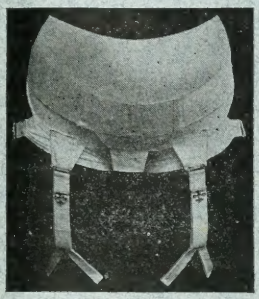

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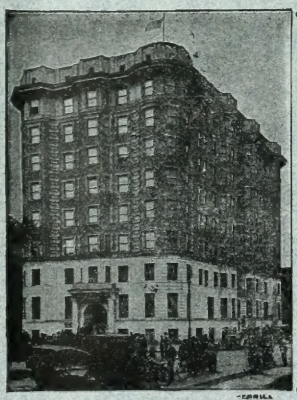

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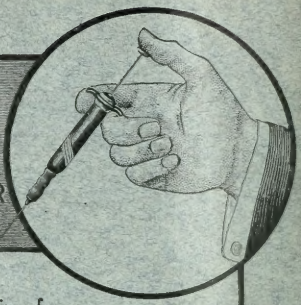

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